FLIGHT
The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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DIARY OF FORTHCOMING EVENTS.

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

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Sept. ...	International aviation week (with competitions) at Brescia, Italy
Sept. 8, 9 and 10	Fédération Aéronautique Internationale Conference, Geneva
Sept. 18–19	Schneider International Race, Venice
Sept. 27 to Oct. 2	Gordon-Bennett Aviation Cup, France
Oct. 1, 2, 3.	A.C.F. Meeting at Buc
Oct. 7 ...	Lecture on "Civil Aviation," by Sir F. H. Sykes
Oct. 21 ...	Lecture, "A Comparison of the Flying Qualities of Single and Twin-Engined Aeroplanes," by Squadron-Leader R. H. Hill
Oct. 23 ...	Gordon-Bennett Balloon Race, Indianapolis, U.S.A.
Oct. or Nov.	U.S. National Aeroplane Race (New York to San Francisco)
Nov. 1 ...	First Open Competition for R.A.F. Boy Mechanics

EDITORIAL COMMENT

LAST week we took occasion to comment upon the lack of an air policy which seems to be characteristic of the Government of the Union of South Africa, and upon the fact that this Government accepted from the home authorities some £2,000,000 worth of machines and stores which have been put to no use at all. We are now informed that not only does the Government decline to make use of these machines, which were offered and accepted for the definite purpose of giving a start to aviation in South Africa, but that the Union Government has apparently gone out of its way to hold back development by the imposition of an *ad valorem* duty of 17 per cent. on all machines and parts imported into the Union by private enterprise. By so heavy a mulct on imported British machines business is held up and development prevented. We are given to understand that there are several groups which are anxious to assist in developing commercial aviation in South Africa, but that the import duty and the general lack of interest on the part of the Government act as a direct prohibitive to enterprise. This seems to us to be the more unfortunate in that South Africa is an especially favourable field for the extension of aerial services. Distances are great, and communications, as a general rule, very poor when the trunk railways are left. There is no water communication to speak of, while roads are mostly conspicuous by their absence, and trade has to be carried on over the roughest kind of tracks. It is in such a country as this that aviation really has its chance to show what it can do in the development of better communications. Yet, owing to the policy, or want of it, shown by the South African Government, there seems to be less hope for the new transport than in any other of the self-governing Dominions.

South African Air Policy

It is no part of our purpose or desire to indicate to the Union Government how it should conduct itself in the government of the Dominion. Doubtless

it has reasons for its policy, which seem good to the Cabinet, though one would need to be on the spot, and fully conversant with all the facts, to be able to appreciate them. At this distance, and in the light of the facts which are available, that policy seems to be perilously akin to that of the dog in the manger. The Union Government accepted with avidity the gift of the machines and stores which were the subject of last week's comments. Having got them, it leaves them simply lying around and declines to make any use of them, and then prevents private enterprise from developing aviation by imposing an unconscionably heavy import duty on British machines and parts. We do not intend to do more at the moment than to simply draw attention to the facts as they are imparted to us. The only comment we need make is that we are very much inclinded to think that had Gen. Botha remained alive and at the head of the Union Government, these things would not have been. They certainly do not seem to be eloquent of "Imperial preference" at its best.

The G.P.O. and the Air Mail

The Post Office has been subjected to quite uncalled-for criticism in connection with the "blue label" which has been instituted for correspondence intended to be forwarded by air mail. A correspondent of *The Times* complains that on the day the announcement of its institution was made it was impossible to obtain the labels from several post offices, including the West Central district office. All we can say as to this is that on the same day we sent out for a supply, and that our messenger was back in a very few minutes in possession of the required labels—and the offices of FLIGHT are within a stone's throw of the West Central district office.

The correspondent in question takes severe exception to the use of the labels at all, which he thinks have been instituted for the benefit of careless sorters who have presumably omitted to notice the inscription "By Air Mail" when written in the corner of the envelope. The theory is quite a tenable one, and from the point of view it indicates we should say that the postal authorities have done very well by the institution of the label in order that similar trouble may be avoided in future. The postal sorters are, as a rule, wonderfully efficient, but even the best is not unlikely to miss an added inscription which has nothing to do with the address. The blue label does away with any excuse for the letter not being forwarded immediately as desired. This correspondent makes the further point that the business man who habitually carries on correspondence with the Continent will be hindered in using the air mail in that he is scarcely likely to carry a batch of blue labels in his pocket-book, and if, after leaving his office, he suddenly remembers some important matter on which he wishes to communicate with somebody abroad, he will be unable to do so for lack of a label. This does not seem to hold much water. What happens if the aforesaid business man discovers that he has no postage stamps in his pocket-book? He is in even worse case, because there is nothing in the regulations which allows him to post a letter without stamping it. True, he can do this, and the recipient will be charged double postage at the other end, to his intense annoyance and chagrin. But the blue label can be dispensed with, if the sender will take the trouble to clearly mark the envelope "By Air Mail," in accordance with the regulations. What there is to complain about here we really fail to see.

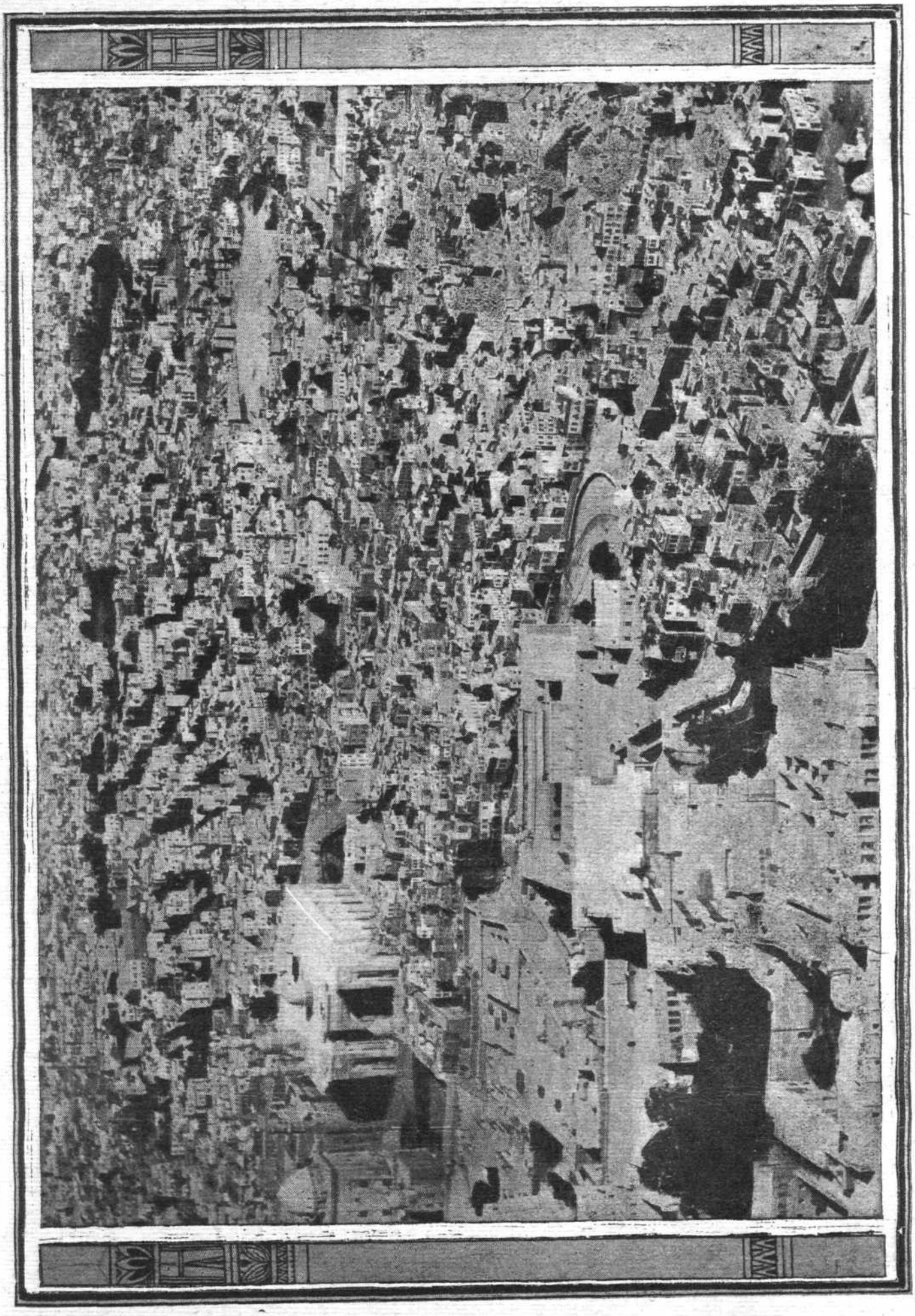
Nothing is perfect in this very imperfect world, and it would be strange if a critic who is out to find fault could not pick holes in the arrangements made by the postal authorities in connection with the air mails. On the whole, we regard the new regulations, and particularly the institution of the "blue label," with considerable satisfaction. Doubtless it will take time for the public to become accustomed to keeping a supply of these handy. Probably the very same difficulties were felt when the first postage stamps were introduced. All these things will right themselves in time. We ourselves have not been at all sparing in our criticisms of the Post Office, so long as that department appeared to view with apathy the carriage of mails by air, but we certainly deprecate criticism which seems to be unreasoned and ill-founded. Our view is that the little blue label is very near akin to a brain-wave for helping along aerial post.

Wireless Telephony and Aviation

We can recollect very few things with so strong an appeal to the scientific imagination as the incident recorded last week, in which Messrs. Instone succeeded in "ringing-up" and speaking to one of their pilots while in transit from London to Paris. The bald facts are that the firm found it desirable to get into touch with a Vickers-Vimy machine of their line, which had left Croydon for Paris before telephone communication could be established with the pilot. The firm thereupon rang up the Air Ministry asking their help, and was enabled by them to have the ordinary telephone into which one of the partners was speaking in his office connected with the wireless telephone installation at Croydon. By aid of the combined telephones he obtained almost immediate communication with the pilot, who was at the time passing over Folkestone. The instructions it was desired to give were duly imparted to the pilot, and the latter, as an additional test of the efficiency of the telephone, read a passage from a newspaper which was perfectly followed in the firm's office in Billiter Street. In describing the audibility of the pilot's voice, Mr. Instone said that he could have imagined that he was only making an ordinary trunk call—he could hear as plainly as though he were listening to somebody speaking to him from Paris.

The scientific interest is tremendous, because of the marvellous progress in wireless science which it denotes. The most significant aspect of the matter lies in the successful linking up of the wireless and the ordinary telephones. During the War some experiments were made in this direction, but they were a long way from being successful, though useful beginnings were made. Enough was accomplished to show the possibilities, and the Air Ministry continued the experiments. By persistence the difficulties had been surmounted, with the astonishing results we have recorded. In the later experiments the Ministry has had the assistance of the Marconi Co. and the G.P.O. Some two months ago a machine in flight over Redhill was spoken to from the G.P.O. by way of the Air Ministry's wireless station at Croydon, but the occasion which forms the text of this article was the first on which the knowledge gained has been put to practical business use.

The Camera and the 'Plane



Old Cairo from above

What it all means to aviation is simply beyond description. We have always insisted that wireless science was linked up hand-in-hand with aviation, and would have to discover some methods of rapidly communicating with aircraft in flight. That has been an almost elementary article of faith from the very beginning, because it is so perfectly obvious that, in default of some such system of rapid communication, aircraft must be more or less blind until aerial navigation and air charts have made considerable advances beyond the standards ruling today. The first great advance made during the War was in the perfecting of directional wireless, which would have served well for all practical purposes. But wireless telephony is obviously as great an advance even on directional wireless telegraphy as the latter was on visual signalling. By its aid we shall be able to communicate instantly and certainly with aircraft operating far beyond the range of vision. The airship flying on the Atlantic route will be as accessible to the spoken message as the man in his office in the next street. There is simply no end to the possibilities—they are infinite.

• • •

Discharge from the R.A.F.

The Air Ministry has notified the conditions under which non-commissioned ranks of the R.A.F. may be permitted to purchase their discharge from the Force. These conditions are set out in full detail elsewhere in this issue of FLIGHT.

The amounts as there stated may be reduced in certain circumstances by authority of the Air Ministry, but in no case can the reduction amount to more than 50 per cent. of the maximum sum payable.

The discharge purchase price may seem to be fixed on the high side, but it must be remembered that the training of an airman is a very expensive process, in comparison with that of the infantry soldier of the line.

It would not be fair to the taxpayer that a man should be able to join the R.A.F. for the purpose of getting a training in a skilled trade and then be able to leave it for civil life simply by payment of a purely nominal charge. For example, the man who has received a thorough training in Group I or II has cost the country far more than the £100 he is called upon to pay for his discharge, and is worth even more as an asset to the Force, provided he is steady rating of good character.

It should be pointed out that no man can claim his discharge on payment. All such discharges are subject to the approval of the Air Ministry, which can grant or withhold them at its discretion. When approved, they are granted as an act of grace.

"WAKEFIELD SCHOLARSHIPS" FOR R.A.F. CADETS

SIR CHARLES WAKEFIELD has generously undertaken to provide funds during the next three years for the award of two scholarships annually, each of a value of £75 per annum, which will be tenable at the R.A.F. Cadet College, Cranwell.

This offer, which has been made in order to assist cadets whose parents or guardians are in reduced circumstances, has been gratefully accepted by the Air Council. The Scholarships will be known as "Wakefield Scholarships."

One scholarship will be offered for competition each year at the examination for admission to the College held in June, and one at that held in November. The first award will be made in connection with the examination held in November, 1920.

The Scholarship on each occasion will be awarded to the candidate from amongst those considered eligible by the Air Council who passes highest in the examination. In determining who is eligible the Air Council will give preference to those candidates whose reduced circumstances are due to the late War. A King's Cadet, a Prize Cadet or a candidate nominated by the Air Council under the Regulations will not be considered eligible to hold a "Wakefield Scholarship."

The Scholarships, which will be tenable for two years, will be paid in advance in equal instalments at the beginning of each of the four terms of residence.

The names of intending candidates should be forwarded to the Secretary (S.7), Air Ministry, Kingsway, London, W.C. 2, from whom any further information required may be obtained. Applications should be received not later than January and May in the case of candidates who propose sitting for the examinations held respectively in the following June and November. Applications should be accompanied by a full statement (which will be treated as strictly confidential) of the circumstances of the candidate's case.

In view of the imminence of the forthcoming examination in November, 1920, applications to compete for the Scholarship will be accepted on this occasion only, provided that they reach the Air Ministry not later than the 1st October, 1920.

Applications to compete for a scholarship should be sent forward independently of the ordinary application for admission to the examination for the purpose of entry to the Royal Air Force Cadet College; these latter applications should continue to be addressed to the Secretary, Civil Service Commission, Burlington Gardens, London, W. 1, and should be forwarded in the manner prescribed and not later than the dates given in the announcement issued by the Civil Service Commissioners in advance of each examination.

Aircraft on the N.W. Frontier, etc.

IN his dispatch dated September 29, 1919, and published recently in the *London Gazette*, General Sir C. C. Munro, Commander-in-Chief in India, gives details of several operations carried out between May 31, 1918, and April 30, 1919. Under the heading "Aden," he states that the Royal Air Force continued to render invaluable service, and co-operated with the artillery in the systematic bombardment of enemy camps. Dealing with the Bushire Field Force, which had a detachment of five R.A.F. aeroplanes, he mentions that aeroplanes, which had arrived from Mesopotamia on January 9, were sent to bomb Robatak at the same time as the force advanced to Kazarun; considerable damage was done, and Nasir Diwan, deserted by most of his following, fled to the hills.

A Canadian Federation

BY way of co-ordinating the activities of the various aero clubs and organisations in the Dominion, an Aeronautical Federation of Canada has been formed as the result of a convention of representatives of the clubs recently held at Winnipeg. It is expected that all organisations in Canada will give their support to the scheme.

Aerial Surveying in Canada

THE firm of Price Brothers, whose timber limits cover an area of more than 8,000 square miles, scattered throughout the eastern part of the Province of Quebec, have secured seaplanes to act as patrols and obtain aerial photographs. This air service will be staffed entirely with officers of the Royal Flying Corps with overseas service.

The Testing of Aeroplane Materials

PROFESSOR C. F. JENKIN, in his presidential address to the Engineering section of the British Association at Cardiff on Tuesday, said that in no branch of the Services was more research work done than in the Air Service, and the advances made in all directions were astonishing.

His own work had been confined to problems connected with the materials for construction, and he had come to the conclusion that the fundamental data on which the engineering theories of the strength and suitability of materials are based required thorough overhauling and revision. Again and again in aeroplane engineering the problems to be solved had raised fundamental questions in the strength and properties of materials which had never been adequately treated.

FLIGHT

AIR MINISTRY NOTICES

Fixed Balloon at Crystal Palace

IT is hereby notified :—

Pilots are warned that a fixed balloon will be flown until October 31 from the grounds of the Crystal Palace, 5 miles N.N.E. from Croydon Aerodrome.

(Notice to Airmen No. 87.)

Hourly Meteorological Reports

IT is hereby notified :—

1. Since August 2, 1920, the hourly reports of meteorological information, prepared by the Forecast Service of the Meteorological Office, and issued by W/T from the Air Ministry (Croydon), are being sent in a modified code, of which particulars are given below. The essential features of the code are the same as those for Collective Station Reports of Class 3 of Annex G of the Convention for International Air Navigation (Paris, 1919), but the following modifications are noted :—

(i) The figures for fitness for flying (F1, F2) are replaced by figures reporting direction and approximate speed of the low cloud.

(ii) The separate codes for high, or medium, and low cloud have been replaced by a single code in which clouds are grouped, but no change is made in the number of figures allocated to cloud reports.

(iii) An additional group has been added to provide for the inclusion of information available only occasionally or at sea coast stations. This group includes more precise specification of the height of the base of the low cloud when it is below 1,000 ft. It includes also the character of the swell and sea disturbance, and the visibility toward the sea, as distinguished from the visibility landward.

(iv) The direction of the surface wind is reported on the scale 0-32, and not as hitherto on the scale 0-72.

2. Reports are issued daily, Sundays included, according to the following schedule :—

Wave length	900 metres
Nature of transmission ..	Continuous wave
Call Sign	G.E.D.

Times of issue 0735 G.M.T. giving observations for 0700 G.M.T.

,,	0835	,,	,,	,,	,,	0800	,,
,,	0935	,,	,,	,,	,,	0900	,,
,,	1035	,,	,,	,,	,,	1000	,,
,,	1135	,,	,,	,,	,,	1100	,,
,,	1235	,,	,,	,,	,,	1200	,,
,,	1335	,,	,,	,,	,,	1300	,,
,,	1435	,,	,,	,,	,,	1400	,,
,,	1535	,,	,,	,,	,,	1500	,,
,,	1635	,,	,,	,,	,,	1600	,,

3. After the call sign G.E.D. comes the word "METEOR," indicating that a meteorological message is being transmitted. This is followed by one 4-figure group, giving the hour (G.M.T.) at which the observations were made; this time group is in turn followed by station index letters and figure groups giving the conditions at the following stations :—

Index letters	Station
FXT	Felixtowe
CDN	Croydon
BGL	Biggin Hill
LMP	Lympne
BCD	Beachy Head
DNS	Dungeness
BOTLEY	Botley Hill (North Downs)

4. The letters DNS, when included, will be followed by a figure giving the Channel visibility at Dungeness. The Channel visibility at *Hythe* is given as the last figure of the fourth group of the report for LMP (Lympne), and the Channel visibility at Beachy Head is given as the last figure of the fourth group of the report for BCD (Beachy Head).

5. The word "BOTLEY" is followed by a statement in plain language of the conditions on the North Downs as viewed from Biggin Hill, when such a statement adds material information to that contained in the rest of the message.

6. At the end of the message a short forecast is given in plain language of the changes in the weather conditions anticipated in the period of daylight following the time of issue. This begins with the word "FORECAST." If there is no reason to modify the forecast sent in the preceding message the words "Forecast unaltered" are sent.

7. The complete results of a pilot baloon ascent at Croydon or Lympne, when available, are inserted in the message at 0835 immediately before the forecast referred to in paragraph 6. This part of the message is preceded by the index letters of the station and by the five-figure index group 49866.

8. Copies of the detailed codes are to be found in Convention relating to International Air Navigation, Paris, 1919 (Command Paper 266), which can be obtained from H.M. Stationery Office. Copies of the additional codes mentioned in paragraph 1 (i), (ii), and (iii), can be obtained on application to the Director, Meteorological Office, Air Ministry, Kingsway, W.C. 2.

9. French reports similar to the above are issued from Le Bourget (call sign ZM, wave length 900 m., continuous wave) at the following times (G.M.T.) :—

0730,	giving observations	for	0700
0930	,,	,,	,,	0900
1030	,,	,,	,,	1000
1230	,,	,,	,,	1200
1330	,,	,,	,,	1300
1530	,,	,,	,,	1500
1830	,,	,,	,,	1800

These reports include observations from the following stations :—

Le Bourget	(Index Group P.1)
St. Inglevert	(,, ,, P.2)
Abbeville	(,, ,, P.3)
Maubeuge	(,, ,, P.4)
Havre	(,, ,, P.5)

The code used is identical with that in which the collective reports for S.E. England are sent, except that in the codes for present and past weather (WW and WW in the third group) only a selection of the numbers in S.E. England code is employed.

In addition, a special message is sent at 09·45 (G.M.T.), giving the upper wind at Le Bourget at 08·00 in the code:

Sernae HHHH Pl Pilot DDVV DDVV DDVV DDVV DDVV, where HHHH = Time of message, DD = Direction of wind on the scale 1 to 72 points, VV = Speed of wind in metres per second, the five groups DDVV referring to the wind at heights of 500 metres (1,500 ft.), 1,000 metres (3,000 ft.), 1,500 metres (5,000 ft.), 2,000 metres (7,000 ft.), and 3,000 metres (10,000 ft.).

Authority for Clause 9—French "Notice to Airmen" No. 10.

(Notice to Airmen No. 88.)

Lizard Wireless Direction Finding Station

THE Lizard Wireless Direction Finding Station ceased to be in operation from midnight (G.M.T.), August 22-23, and will not function until further notice. The position of this station is Lat. 49° 59′ 07″ N., Long. 5° 12′ 18″ W. Authority: The Lords Commissioners of the Admiralty (Notice to Mariners 1300 of 1920).

(Notice to Airmen No. 89.)

Cloud and Visibility Signals at Lympne Aerodrome

A SYSTEM of ground signals has been established at Lympne Aerodrome to denote to pilots the height of clouds above and visibility at Biggin Hill and Croydon Aerodromes. The stations will be denoted by letters, B. representing Biggin Hill, and C. representing Croydon.

The height of clouds and visibility will be indicated by numerals. All signals are *white*. Height of clouds will be denoted by the following numerals: 1 = 0 to 200 feet; 2 = From 200 to 500 feet; 3 = Over 500 feet. These signals represent the height of clouds *above the respective aerodromes and not above sea level*.

Visibility will be shown in a similar way, viz. :—1 = Below 500 yards; 2 = 500 to 1,000 yards; 3 = Over 1,000 yards.

The signals are always displayed in the following order :—(1) Station; (2) Height of clouds; (3) Visibility; *e.g.*, B. 1 2, or C. 2 3. The signals are situated approximately 30 yards east of the Office of the Civil Aviation Traffic Officer and 140 yards west of the Compass Base. They are so placed as to be read the right way up when flying in a north-westerly direction.

(Notice to Airmen No. 90.)

Air Force Courts Martial Rules

THE Air Ministry has given the usual notice in the *London Gazette* of "The Rules of Procedure (Air Force), 1920," which will govern the administration of Courts Martial in the Air Force. Copies of the proposed rules can be obtained by any public body on payment of 3s. per copy before September 26, by application to the Secretary, Air Ministry, Kingsway, W.C.2.

H.M. AIRSHIP "R. 80"

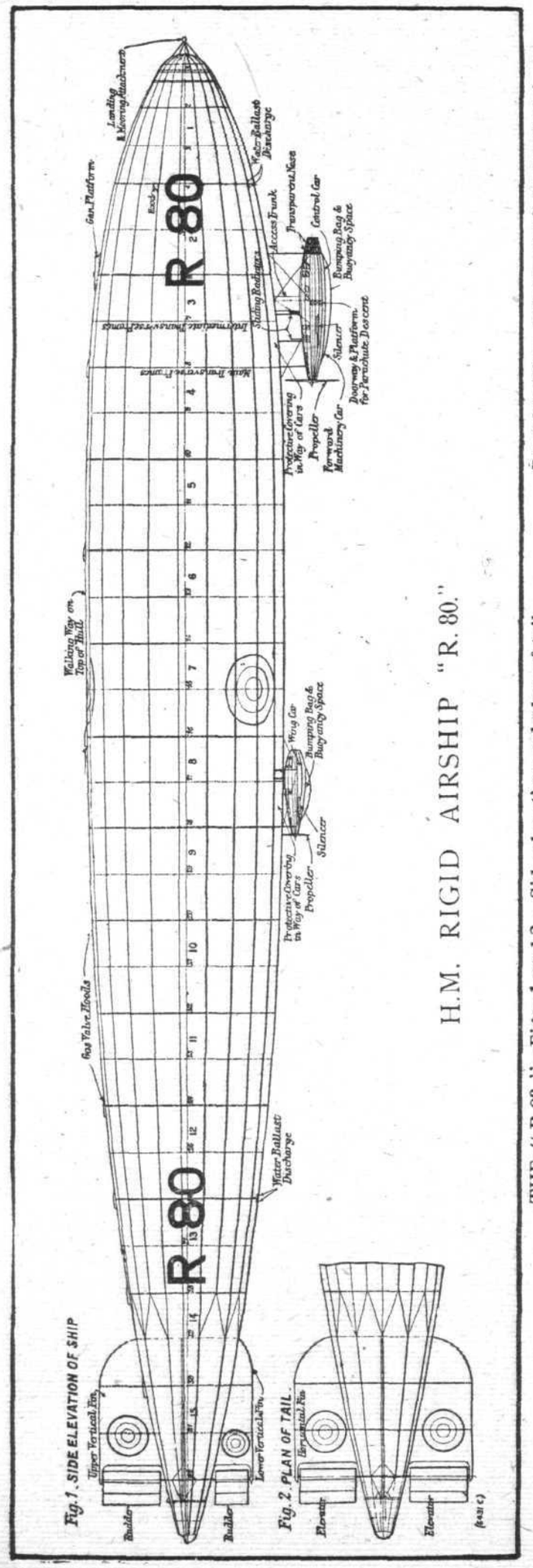
A Description of the New Vickers-Built Rigid Airship

[As briefly recorded in our issue of July 22, the new rigid airship built at Barrow by Messrs. Vickers, Ltd., for the Government, was launched on July 19, when she carried out a successful trial cruise of over two hours' duration. The new rigid, the "R.80," marks a decided advance on previous types in several ways, with the result that her disposable lift is as high as 46·3 per cent. of the total lift, while her cruising radius at economical speed is 6,400 miles. This, it will be seen, represents a very great advance, and proves that great strides are being made, not only abroad but also in this country, in the design of lighter-than-air craft of the rigid type. The maximum speed is about 65 m.p.h. according to estimates, no opportunity having yet been available for actual test flights at full power. A good idea of the details of the construction will be gained from the following description, drawings and photographs, for the use of which we are indebted to our contemporary *Engineering*.—ED., FLIGHT.]

A GENERAL view of the completed vessel is given in Fig. 17, but a rather better idea of its proportions will be obtained from an examination of the line drawing, Fig. 1. The overall length of the hull, which is of good streamline form, is 529 ft., without the mooring attachment shown on the latter illustration. This device increases the length of the ship by 5 ft., making the total length 534 ft. The gas capacity is rather more than 1,250,000 cub. ft., giving a gross displacement of 38·25 tons. Of this 17·8 tons (46·3 per cent.) is disposable lift. In section, the hull, for the greater part of its length, is a uniform polygon having 21 sides, and the diameter of the circumscribing circle at the largest part is 70 ft. 7½ ins. which also represents the maximum width. The overall height of the ship from the bottom of the bumping bags on the cars, to the top of the hull is 86 ft. 5 ins. when the axis is horizontal. The ship is propelled at a maximum speed of 65 m.p.h. by four engines carried in three cars suspended from the hull structure and developing 1,000 h.p. at full power. The speed at normal power is 60 m.p.h., and at cruising power 50 m.p.h., at which latter speed the range would be 6,400 miles. The range at full power would be 3,900 miles, and at normal power, 4,500 miles. The minimum weight of crew, stores and ballast required for a prolonged flight is 3·8 tons leaving the remainder of the disposable lift (14 tons) available for fuel and oil. The maximum height attainable by the ship as a free balloon is 19,500 ft., but, with full crew and stores, the maximum height that could be reached would be 17,000 ft.

The streamline form of the hull is of the most efficient shape possible for the length and diameter of the ship (these dimensions being limited by the size of the shed), as determined by the tests of scale models. Fig. 4 shows clearly the general arrangement of the framing. Main transverse frames occur between the gasbag ends, and intermediate transverse frames are placed midway between them. There are 11 main longitudinals, and 10 intermediate ones, all hull framework girders being of triangular cross-section. Transverse wiring, which is fitted at the main frames only, is shown in Fig. 9, and is arranged to transmit the lift of the gas to the keel girder, and to maintain the shape of the transverse section, whilst a longitudinal stay connects the transverse wiring at each main frame, to assist in distributing the gasbag end pressures. The main diagonal bracing wires consist of three series—major, minor and mesh wiring. The first two are on the external surface of the ship, the major wiring forming diagonals in the panels formed by the main longitudinal and main transverse girders, whilst the minor wiring joins the corners of the panels formed by the main longitudinal and main and intermediate transverse girders. The mesh wiring, which is on the inner surface of the girders and is indicated in the centre part of Fig. 4, transmits the gasbag lifting pressures to the framework. The pitch of the mesh is half a metre square The keel girder is of triangular form in cross-section, having its base formed by the lowest flat of the transverse frame polygon. This keel contains the cabins, bombs, petrol, water ballast, etc., and is sufficiently strong to transmit all loading, including the weight of the cars, to the main structure. The members of the keel structure are mostly triangular, consisting of three channel sections braced together by bracing pieces made from stampings. In certain cases the girders are square in section, consisting of four sections similarly braced. A walking way is provided throughout the entire length of the keel girder, with branches to the wing cars.

Fig. 18 is a general view of the completed hull framework



THE "R.80."—Figs. 1 and 2: Side elevation and plan of tail.

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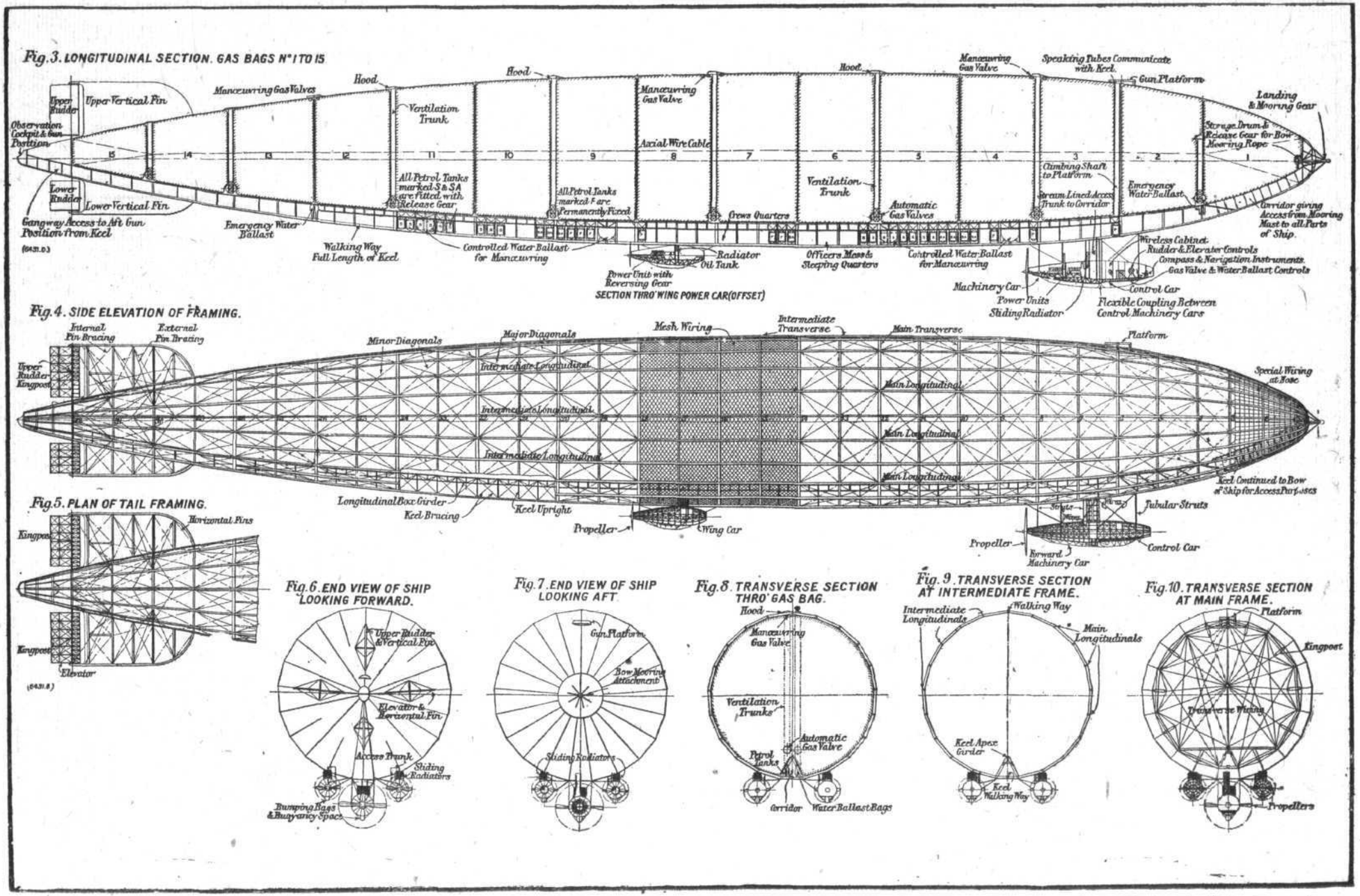

THE "R.80."—Figs. 3 to 10: Showing lines and constructional details

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LONGITUDINAL ELEVATION WITH OUTER STARBOARD SIDE CASING REMOVED.

Fig. 11. FORWARD MACHINERY AND CONTROL CAR.

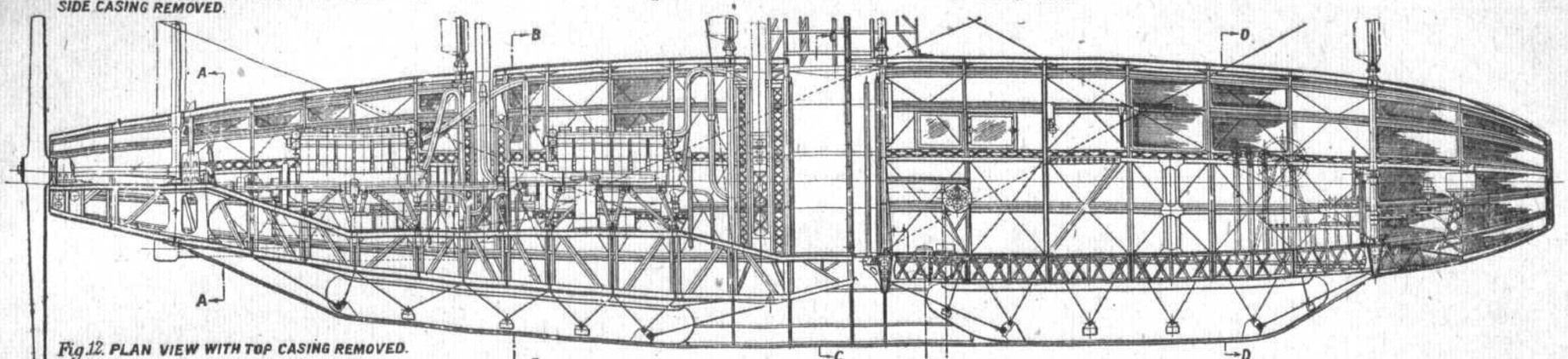


Fig. 12. PLAN VIEW WITH TOP CASING REMOVED.

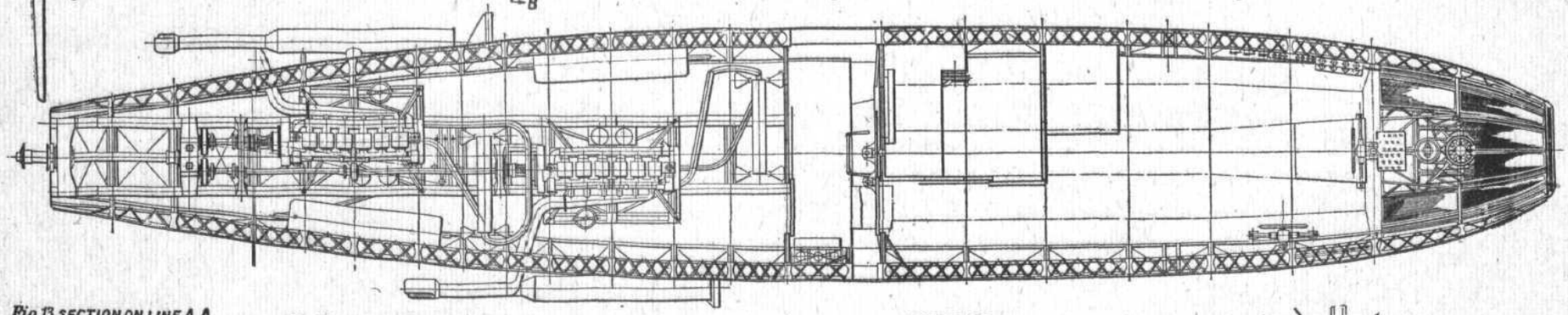


Fig. 13. SECTION ON LINE A.A.

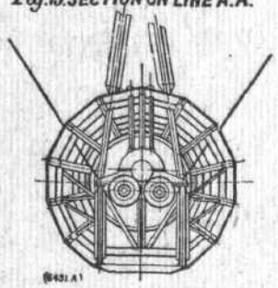


Fig. 14. SECTION ON LINE B.B.

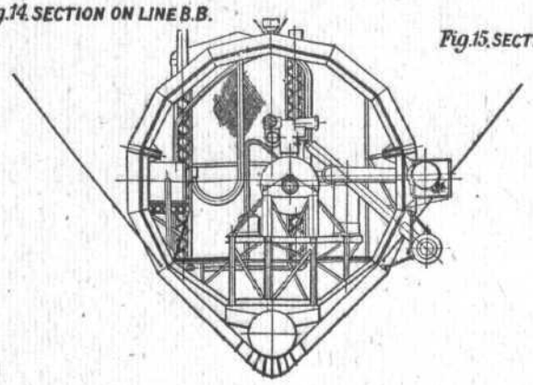


Fig. 15. SECTION ON LINE C.C.

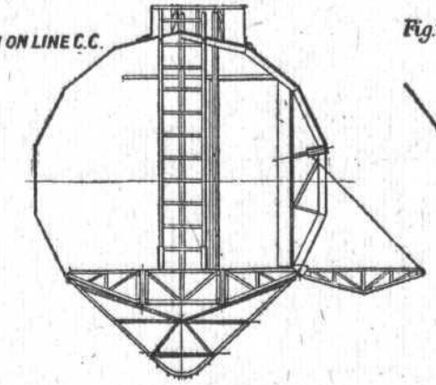
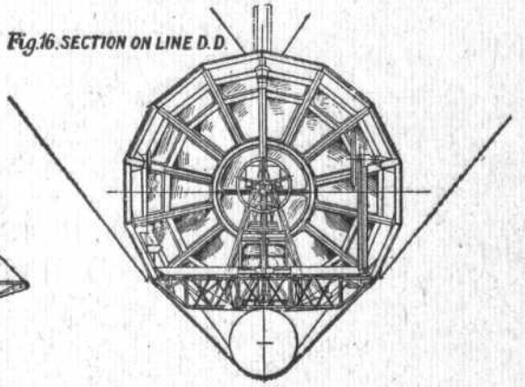


Fig. 16. SECTION ON LINE D.D.



THE "R.80."—Figs. 11 to 16: Details of the car

Reproduced from "Engineering" by permission

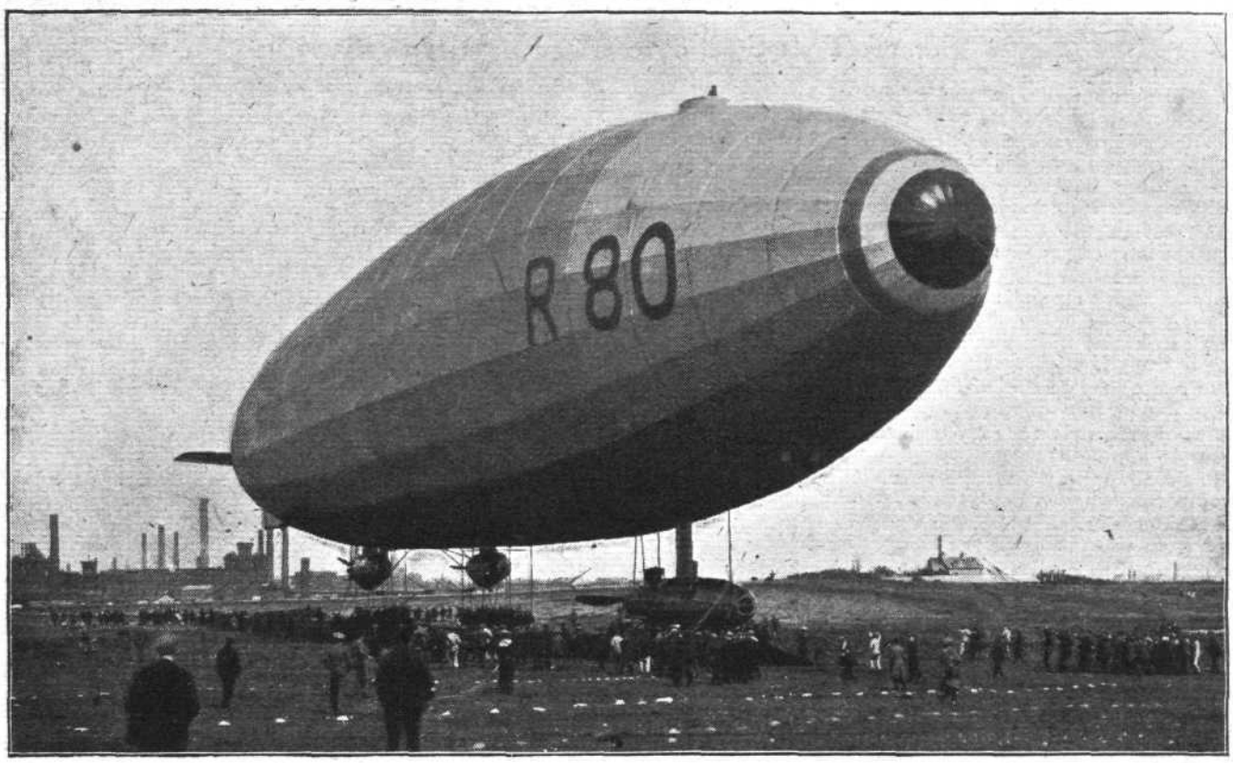
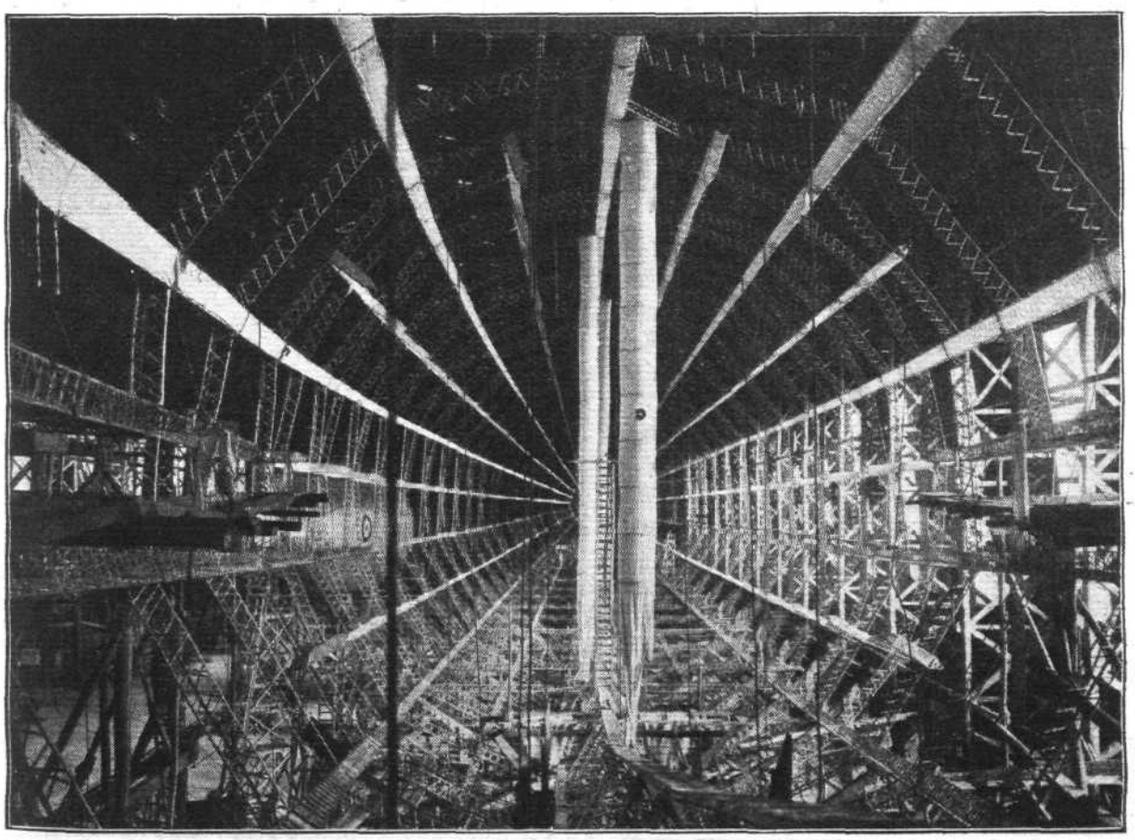


Fig. 17.—Airship preparing for trial flight

before the gasbags have been put in place. The gas vent trunks, which will be referred to later, and the corridor framework are also clearly shown in this illustration. A more detailed view of the latter is given in Fig. 21, which also shows the flooring of the officers' quarters and the section utilised for petrol storage.

The total gas space is divided into 15 compartments, as shown in Fig. 3, each compartment containing one gasbag. The maximum length of any of these bags is 10 metres, and they are fitted with inspection windows, purity connections, filling necks, automatic gas valves, and manœuvring gas valves where necessary.

(To be Concluded)



The "R.80."—Fig. 18: Interior of hull framework, showing vent trunks and corridor

THE AIR MINISTRY COMPETITION AT MARTLESHAM

Several Tests Still to be Made by Large Machines

SLOW but sure might be the motto of the Air Ministry competition now in progress at Martlesham Heath aerodrome, near Woodbridge, Suffolk. Unfavourable weather during the whole of the competition, with the exception of a few days here and there, has been the cause of delay in carrying out the tests. The result is that the lay press is beginning to lose interest in the trials, and one fears that the general public, not realising the nature of the competition, is inclined to form an unfavourable opinion of what is being done. To those who appreciate the character of the tests the delay does not come as a surprise. Several of the tests have to be carried out in what practically amounts to a dead calm, and thus the days pass without the possibility of carrying out the tests. By the uninitiated this may be put down to inability on the part of the competing machines, whereas, as a matter of fact, it is nothing of the sort.

While it is regrettable that an unfavourable impression may be created in this way, it is difficult to see how this could be avoided, and one wishes to point out here that, as regards the actual results obtained, the delay does not in any way detract from the merits of the competition. We think that those responsible for the drafting of the rules did quite right in insisting on calm weather for certain of the tests. Otherwise no fair comparison could have been made between the various competing machines. Even as it is, most of the machines in the small class have passed the majority of their tests, and a few days of reasonably good weather should see the end of the competition in this class. As regards the larger machines, the matter is somewhat more complicated, as these are "all" twin-engined machines, for which special tests have been drafted with an object of finding out the capabilities of flying on one engine only. At the time of writing only the Vickers Vimy-Commercial has succeeded in doing this, and there still remains the getting-off test with one engine throttled down. This is a much more difficult test than is generally realised, since it is one thing to be able to fly level on one engine, but quite another to be able to get off on one engine only. It may even be doubted whether any of the machines will succeed in passing this test, although the fact that half-load is permitted will help materially in making a get-off possible.

The Handley Page W.8, which has had several minor mishaps during the early days of the competition, has now got going, and has since then done remarkably well. A week ago it was generally thought that the Vimy-Commercial would be the winner in the large class, but the performance put up by the Handley Page during the last few days rather leads one to expect a very close race between that and the Vickers. Thus the high speed made by the W.8 is the highest attained by any machine in the competition, irrespective of class, while the figure for economy (weight of useful load divided by number of gallons of fuel consumed in reliability test) is equally well ahead of anything else done at Martlesham so far. The landing and getting-off tests still have to be made by the Handley Page, but as the power loading is fairly low, this machine should get good marks in the getting-off test at any rate, even if it does not manage to land within the prescribed 275 yards.

In the small class the indications are that the Westland Limousine may win first place. One cannot be absolutely certain of this, however, since it is not only performance that will determine the results, but also general features. In judging these the personal equation comes in, hence the uncertainty; but certainly there are a number of most commendable features about the Westland, such as separation of engine from cabin by fireproof bulkhead, placing of petrol tanks where they are away from the hot engine in case of a crash, and a number of other well thought-out details which should help materially in obtaining good marks in the general features section. It is of interest to note that the two machines having the best performance so far in both classes, the Westland and the Handley Page, are both fitted with Napier aero engines.

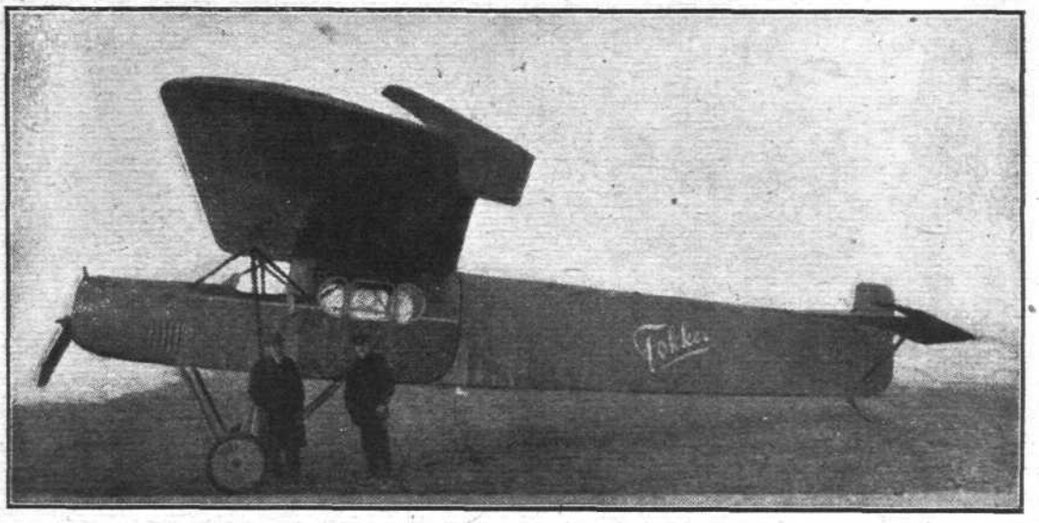
In the accompanying table we have compiled the results available up to the time of going to press. Where marks are given the + signs indicate marks awarded, — signs marks forfeited. In the getting-off and landing tests it is stated that the marks are given and forfeited for every *complete* foot and three yards respectively, while in the speed tests no such qualification is made. In the case of the latter we have, therefore, used fractional marks. Whether this will be done by the judges we have no means of knowing. If not, the only alteration necessary will be the substitution of marks corresponding to the nearest complete mile per hour, remembering that the allowance is *one* mark per m.p.h. for maximum speed, and *two* marks per m.p.h. for low speed. The table is, it will be realised, not complete as yet, but we hope to be able to make it so as results become known and the final official decisions are made available.

TABLE SHOWING PROGRESS OF COMPETITION

Machine ..	Austin	Avro	Beardmore	Bristol	Sopwith	Westland	Handley Page	Vickers
Pilot ..	M. D. Nares	H. A. Hamersley	G. Powell	C. F. Uwins	H. G. Hawker	A. S. Keep	Major Brackley	Capt. Cockerell Capt. Broom
Engine ..	200 Beardmore	240 "Puma"	200 Beardmore	240 "Puma"	180 Hispano	450 Napier	2–450 Napier	2–360 R.R. "Eagle"
No. of passengers	1	4	1	1	2	5	15	10
Span ..	38′ 6″	37′ 3″	46′ 0″	..	46′ 6″	54′ 0″	75′ 0″	67′ 0″
Length ..	25′ 6″	29′ 10″	26′ 0″	..	30′ 6″	33′ 6″	60′ 0″	42′ 8″
Area	417 sq. ft.	498 sq. ft.	540 sq. ft.	..	550 sq. ft.	726 sq. ft.	..	1,330 sq. ft.
Weighed-in	4/8/20	3/8/20	7/8/20	3/8/20	3/8/20	6/8/20	..	4/8/20
Reliability ..	..	7/8/20	..	12/8/20	4/8/20	12/8/20	18/8/20	7/8/20
Economy $\frac{W}{G}$ =	..	3·63	..	2·22	4·3	8·65	9·3	6·33
Uncontrolled flight	5/8/20	—	..	16/8/20	6/8/20	12/8/20	..	11/8/20
Glide from 500 ft.	5/8/20	4/8/20	..	12/8/20	5/8/20	12/8/20	21/8/20	11/8/20
High speed	6/8/20 109·96 m.p.h.	4/8/20 95·7 m.p.h.	..	7/8/20 108·3 m.p.h.	6/8/20 110·35 m.p.h.	13/8/20 117·7 m.p.h.	21/8/20 118·5 m.p.h.	11/8/20 102·73 m.p.h.
Marks ..	+9·96	−4·3	..	+8·3	+10·35	+17·7	+18·5	+2·73
Low speed ..	9/8/20 45·1 m.p.h.	12/8/20 51·5 m.p.h.	..	13/8/20 49·07 m.p.h.	12/8/20 43 m.p.h.	13/8/20 46·05 m.p.h.	..	11/8/20 49·63 m.p.h.
Marks ..	−·2	−13	..	−8·14	+4	−2·1	..	−9.26
Landing ..	..	14/8/20 239 yds.	..	..	14/8/20 187·7 yds.	17/8/20 235 yds.	..	14/8/20 308 yds.
Marks ..		−21	..	..	−4	−20	..	−11
Getting-off ..	16/8/20 3·8 ft.	12/8/20 1·18 ft.	..	16/8/20 19·27 ft.	12/8/20 23 ft.	12/8/20 22·75 ft.	..	12/8/20 26·45 ft.
Marks ..	+3	+1	..	+19	+23	+22	..	+26

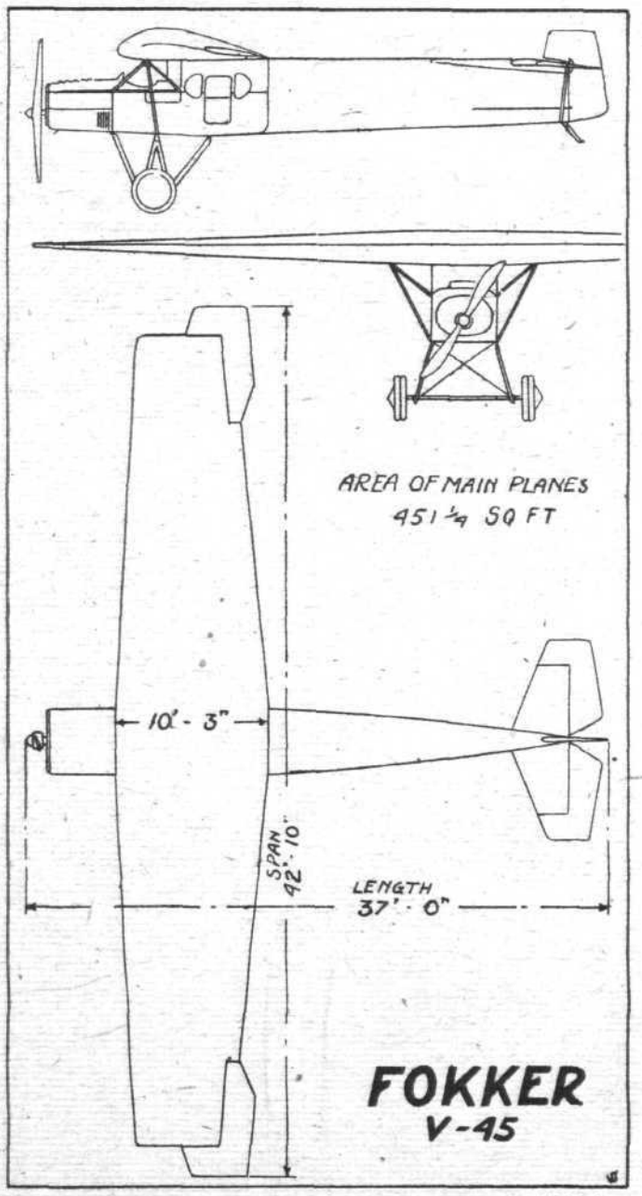
FLIGHT
AIRCRAFT ENGINEER AIRSHIPS

A FOKKER SIX-SEATER LIMOUSINE MONOPLANE



The Fokker V-45 passenger machine

IN spite of the objections raised to cantilever wings from many quarters, several German designers continue to employ this system, which one might say originated with the War machines, in recent designs of commercial craft. Among these is Fokker, who, although he has again become Dutch, is generally looked upon as a German designer, as, practically speaking, his whole aeronautical education has been "made in Germany." In addition to some sporting single-seaters with engines of 35 and 50 h.p. (a sketch, together with the principal characteristics of the 35 h.p. "Parasol," appeared in the article on Small Sporting Aeroplanes in FLIGHT for May 13 last), he has now brought out a larger machine with seating accommodation for six people, including the pilot. This machine—also of the parasol type—which is known as the V-45, is fitted with a B.M.W. (Bavarian Motor Works) engine of 185 h.p., which is mounted in the nose of the *fuselage*, behind a circular radiator. The accompanying illustrations show the general lay-out of the machine.



A Fokker passenger-carrying monoplane, 185 h.p. B.M.W. engine. General arrangement sketch

The pilot is placed immediately behind the engine, where his view in a downward and forward direction is very good, but for looking aft or upward this position leaves much to be desired, as the view is obstructed by the passengers' cabin, as well as by the wings. Just behind the pilot's cockpit the *fuselage* rises up to meet the wing, and forms a cabin with comfortable seating-accommodation for the passengers. The cabin is entered through a door in the side, as shown in the illustrations, and windows afford an excellent view of the country over which the machine is flying, there being no bottom plane to obstruct the view. There is, we believe, accommodation for a small amount of luggage in addition to the six passengers.

Apparently the *fuselage*, which is of rectangular section tapering to a vertical knife-edge at the stern, follows the usual Fokker tubular steel construction—but on this point we are not absolutely certain.

The undercarriage is of very substantial design, the struts consisting of steel tubes forming a letter W in side elevation. There are four landing-wheels, two on each end of the axle, placed close together. The chassis is wire-braced transversely from the central tubular members of the "W."

The monoplane wing is of the tapered type, being reduced in camber as well as chord at the tip, both leading and trailing edges tapering. The *ailerons* are comparatively small, and do not, it will be seen, extend far inward. They are balanced in the usual manner.

It will be noticed that the wings are supported at the centre not only by the *fuselage* but by three struts extending outwards each side of the latter some 5 ft. or so from the centre. These struts, two of each set of three abutting on the upper *fuselage longerons* and the third on the lower, serve to support the wings forward of the cabin, over the pilot's cockpit.

The tailplane and elevators, which, also, are comparatively small, are mounted on the top *longerons* of the *fuselage*, above the line of thrust and level with the wings. The tail plane has little, if any, camber. The elevators are divided and balanced, and hinged to the sternpost of the *fuselage* is a large balanced rudder. The whole of the tail is braced by means of tubular streamline struts, attached at their lower ends to the bottom of the *fuselage* sternpost, and at their upper extremities to the trailing edge of the tail plane.

Three-quarter front view of the Fokker V-45

The following table gives the main characteristics of the machine :—

Length overall	37 ft.
Span	42 ft. 10 ins.
Area	451¼ sq. ft.
Weight empty	2,640 lbs.
Weight fully loaded	4,180 lbs.
Climb	13,200 ft. in 45 minutes.
Maximum speed	93 m.p.h.
Radius of action	744 miles.
Load per sq. ft.	9·3 lbs.
Load per h.p.	22·6 lbs.

PURCHASE OF DISCHARGE FROM THE ROYAL AIR FORCE

THE Air Ministry announces :—

The following rates have been established as those which shall be paid by airmen who are permitted to purchase their discharge from the Royal Air Force :—

	£
(i) Recruits (airmen or boys) with less than three months' service	20
(ii) Boys and airmen who entered as boys, who have been, or are being, trained in the Royal Air Force for a trade in Group I or for a trade in Group II the equivalent of which in civil life would have involved the serving of an apprenticeship	100
(iii) Boys, and airmen entered as boys, who have been trained or are being trained in the Royal Air Force in a trade in Group II the equivalent of which in civil life would not have involved an apprenticeship	60
(iv) Airmen entered as semi-skilled men whose training was continued in the Air Force in any of the trades in either Group I or II	60
(v) Airmen (including boys) entered and trained in the Navy, Army or Air Force and subsequently placed in Group A.B.C. or D. of the R.A.F. Medical Service	60
(vi) All other airmen, and airmen serving in Class "E" of the Royal Air Force Reserve	35

The trades in Group II which in civil life would involve an apprenticeship are shown below: Balloon basket maker, electrician, machinist, carpenter, coach-painter, sheet-metal worker, tinsmith.

The above amounts may be reduced in certain circumstances by authority of the Air Council, provided that such reduction does not exceed 50 per cent. of the total sum payable.

Applications by Relatives.—Applications by parents or guardians in respect of boys should be made by letter, giving the fullest possible particulars of the circumstances in which the application is made, addressed to: The Secretary, Air Ministry, Kingsway, London, W.C. 2. Applications submitted by boys on their own behalf will not be considered.

Applications by relatives of serving airmen should be made by letter, giving the fullest information of the circumstances in which the application is made, addressed to the officer commanding the unit in which the airman is serving.

Applications by Reservists.—Applications from airmen who are serving in the Reserve should be submitted to the Officer i/c Records, Royal Air Force, Blandford, Dorset.

THE INSTITUTE OF AERONAUTICAL ENGINEERS NOTICES

August Notices

Council.—The Council met on August 17.

Elections. — Member : Lieut.-Commdr. V. N. Bieg, U.S.N. *Associate Member :* R. B. C. Noorduyn. *Associates :* J. L. W. McDowall, N. W. Jackson, E. S. R. Thorne (all nominated for Intermediate Examination); J. C. C. Taylor (nominated for Pilots' Examination). *Student :* Chaucer Wood.

Branches.—The rules for the issue of charters for the formation of foreign, colonial and provincial branches of the Institute, proposed by the Branches Committee, have been ratified by the Council.

Lectures.—Arrangements are being made for the following lectures to be delivered during the months of October and November respectively :—"The Structure of Steels," by Col. N. T. Bolaiew, C.B.; and "The Education Act of 1918," by S. T. G. Andrews, Esq., B.Sc. (Eng.), M.I.Ae.E.

Papers.—During the winter session meetings will be arranged for the delivery of short papers, as distinct from lectures. Members who have subjects for discussion at such meetings are invited to send a brief outline of the points they have to bring forward.

DOUGLAS SHAW,
Secretary

Polish Staff Thanks Aviators

THE *communiqué* issued by the Polish General Staff on August 18, dealing with the opening of the advance against the Bolshevists, concluded: "The Commander-in-Chief records with gratitude the intense and fruitful activities of the squadrons of the Third Flying Division, commanded by Major Fauntleroy. On the 16th these squadrons carried out 49 flights, which were most effective in holding up the advance of the enemy."

FLIGHT

DURALUMIN

BY E. UNGER AND E. SCHMIDT

(Translated from *Technische Berichte*, Vol. III—Section 6, by STARR TRUSCOTT)

THE use of duralumin in the construction of aircraft makes an account of the properties of this material desirable, especially with reference to its working qualities as developed by experience.

Composition, Specific Gravity and Melting Point

Duralumin is made in various compositions, and has, with the exception of small quantities of impurities, the following composition :—

Aluminium	..	95·5 to 93·2 per cent.
Magnesium	..	0·5 ,,
Copper ..	..	3·5 to 5·5 ,,
Manganese ..	..	0·5 to 0·8 ,,

Lead, tin and zinc, which, as is well-known, have an unfavourable influence upon the permanence of aluminum alloys, are not found in duralumin.

The specific gravity of duralumin varies according to composition and hardness from 2.75 to 2.84. The melting point is about 650° C.

Duralumin is made under this name by the Dürener Metallwerke, Düren (Rhld.), and under the name of Bergmetall by Carl Berg, Eveking (Westf.).

Working of Duralumin

Like other metals, duralumin can be rolled into plates and shapes and behaves in a similar manner, in that the elongation decreases as the hardness of rolling increases. Tube blanks, however, can be made only by pressing, and not by the oblique rolling method.

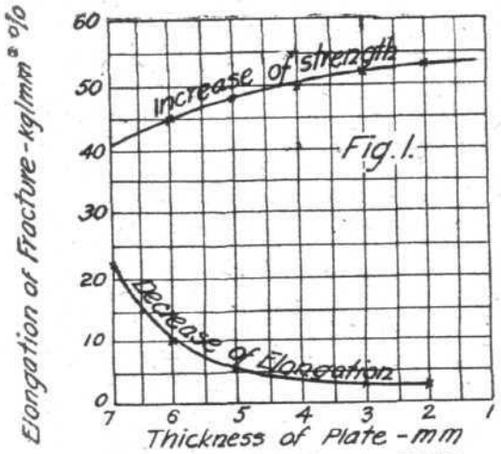
Fig. 1 shows the increase in tensile strength and decrease in elongation of a duralumin plate as its thickness is reduced by cold rolling from 7 mm. to 2 mm. The strength increases from 41 kg. to about 54 kg. per sq. mm., while the elongation falls from 22.7 to 2.3 per cent. The curve shows that the elongation decreases very rapidly with the very first reduction in thickness.

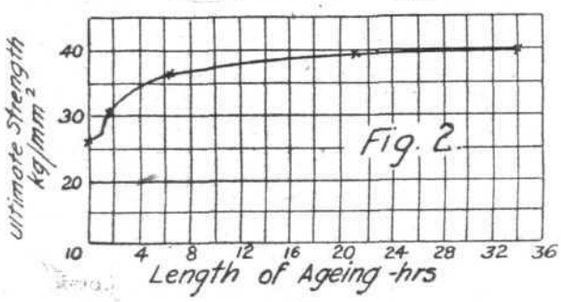
However, duralumin can be worked hot at a temperature of about 400° C. very well.

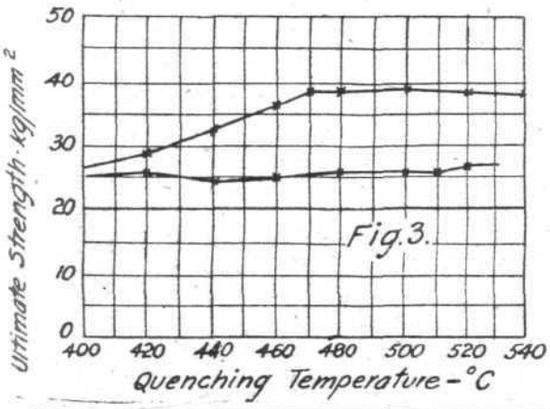
Tempering

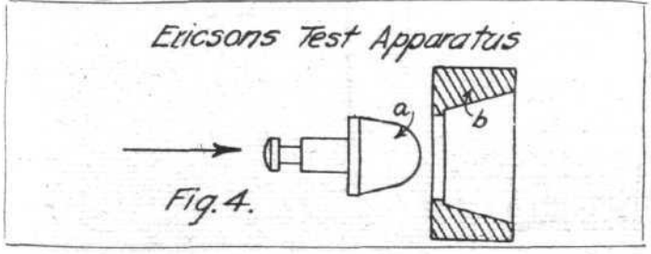
Duralumin can be tempered, like steel, by heating and sudden cooling. For this purpose plates, tubes, and shapes are heated to between 480° and 510° and quenched, then aged ; that is, the treated material is simply set aside. The original strength characteristics are very nearly restored after the quenching, but the tensile strength continues to grow with the time of ageing, from 35 to 50 kgs. per sq. mm. The elongation does not decrease, but remains at least the same, and usually increases slightly. In practice the greatest strength is reached after about five days of ageing.

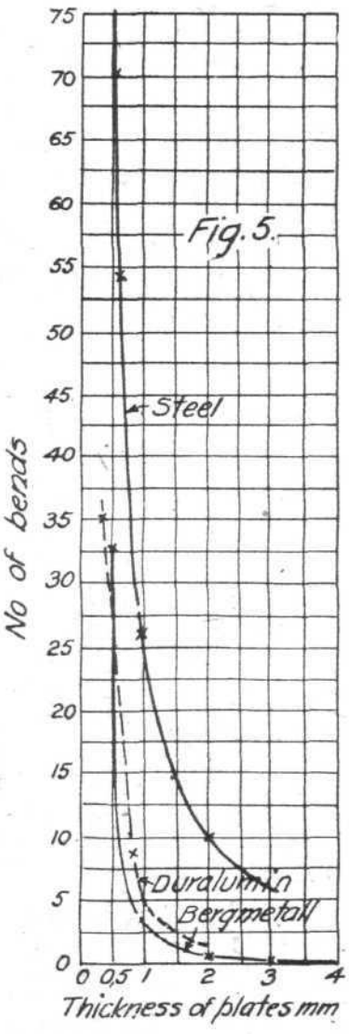
When heated to over 530° C. duralumin becomes unusable. Consequently the treating is carried on in a bath of nitrates, whose temperature can be carefully regulated and watched. During the ageing of the metal, work cannot be done on it which would change the section, as in that case the strength will not increase any more. After the completion of ageing, the material can be re-rolled in order to obtain smooth

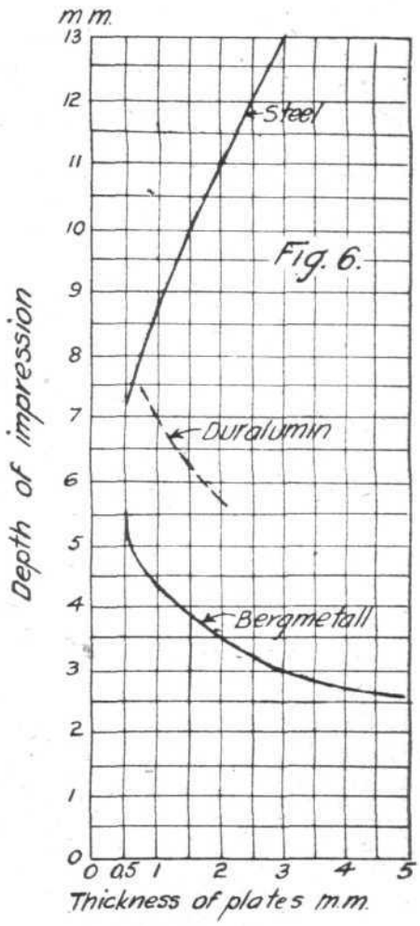












surfaces. The strength is thereby increased at the expense of elongation.

Fig. 2 shows the increase of strength during ageing. The tensile strengths were determined by the Ericson test with 0.385 as a coefficient. This value was obtained from the experiments described below.

Experiments have been made (*see* Fig. 3) by the Dürener-Metallwerke to determine the most favourable quenching temperature. The curve "*a*" shows the variation in the strength of duralumin which had been aged for four days with the variation of quenching temperature. Curve "*b*" shows the strength immediately after the quenching. The strengths were determined in both cases by the Ericson test.

As the material may warp in tempering, it is not good practice to temper riveted parts. Such parts should be tempered before they are riveted.

Strength Properties

Duralumin is delivered in various compositions which have different properties according to the purpose for which it is intended to be used. It is therefore important that the concern supplying the material should be informed regarding the nature of the working proposed. In Table 1 below, are assembled the strength figures of some duralumin compositions made by the Dürener-Metallwerke :—

Symbol for composition	Condition.	Method of preparing.	Elastic limit kg/mm²	Tensile strength kg/mm²	Elongation in per cent.	Modulus of elasticity kg/cm²	Sections available
681*b* 1/3	Tempered only	Tempered ..	24 to 26	38 to 40	20	About 500,000 ..	Tubes, plates, strips, bars and shapes
681*b* 1/3	1/2 hard ..	Tempered and cold rolled	30	40 to 42	16 to 14	500,000	Tubes, plates, strips, bars
681*a*	Tempered only	Tempered ..	25 to 27	38 to 40	20 to 18	600,000	Tubes, plates, strips, bars and shapes
	Hard ..	Tempered and cold rolled	30 to 32	44 to 46	11 to 10	—	Tubes, plates, strips, bars and shapes
681*h*	Tempered only	Tempered ..	26 to 28	38 to 42	18 to 15	600,000	Tubes, plates, strips, bars and shapes
	Hard ..	Tempered and cold rolled	32 to 34	45 to 48	11 to 10	—	Tubes, plates, strips, bars
N	Tempered only	Forged rivets are tempered	20	32 to 34	18 to 14	Shear strength up to 6 mm. diameter, 25 kg./mm.²	Finished rivets

TABLE 2.—*Strengths, No. of Bends, Depths of Impressions for Steel and Bergmetall*

Steel					Bergmetall			
Thickness of plate mm	Strength kg/mm²	Elongation per cent.	No. bends	Depths of impression mm.	Strength kg/mm²	Elongation per cent.	No. bends	Depth of impression mm.
0·5	36	10·5	76	7·2	47	10·5	33	5·5
1	34	15·3	26	95	47	11·0	3	4·2
2	39	12·0	10	10·9	45	11·0	Fractured at 90°	3·4
3	40	17·7	6	13	48	14·1	Fractured at 60°	3·0
4	—	—	—	—	48	9·7	Fractured at 45°	2·8

The modulus of elasticity of the hard composition 681*a* was found by the Technischen Hochschule Aachen to be 700,000 kgs. per sq. cm. Making allowance for the possible effect of vibration on the modulus of elasticity, it appears better to use not more than 650,000 kgs. per sq. cm. in computations.

In judging as to the suitability of a material for use in stressed parts, not only the tensile strength, but also the ductility is of great importance. This can be determined by bending strips backward and forward through 180° over a definite radius—usually 5 to 10 mm.—the number of bends before fracture being taken as a measure. Other conclusions as to the ductility can be obtained from the Ericson test (*see* Fig. 4). The plate to be tested is pressed through a ring, "b," by a head, "a," until a tear shows on the upper surface of the sheet. The depth of the impression is then a measure of the ductility.

In Table 2 there are compared strength values, numbers of bends (over 5 mm. radius, and through 180°), and depths of impression as observed on Bergmetall plates and steel plates of equal thicknesses.

Although the strength values of the steel plates are less than those of the duralumin plates, nevertheless one can compare the figures as to number of bends and depths of impression without correction, since it is possible to obtain steel plate with higher strength which also possesses great ductility.

The number of bends (*see* Fig. 5) for both metals decreases with increased thickness. For steel, however, they lie considerably higher than for duralmin. The difference is least for plates under 0.5 mm. in thickness. For thicker plates of duralumin, the number of bends decreases very rapidly. A plate 2 mm. thick breaks over a 90° bend ; a plate 4 mm. thick over a 45° bend. From these results duralumin might be referred to as " cold short " for thicknesses greater than 1 mm. This property makes it unsuitable for highly stressed parts which must at the same time withstand vibrations. This is of prime importance in connection with the bent lug plates which are ordinarily used in aircraft for taking wire terminals. In these lugs vibrations undoubtedly occur during flight which would reduce the strength of the duralumin and might cause sudden fracture.

Exactly how vibrations influence the modulus of elasticity has not yet been determined, although experiments along this line are already under way.

A comparison of the depth of impression of steel and duralumin shows (*see* Fig. 6) that for steel the depth of impression increases with the thickness of the material, while for duralumin it decreases. As a result of a peculiarity of the testing machine used, the greatest stress occurred at a point which was from 5 mm. to 6 mm. from the vertex of the depression. In this locality the material began to flow before cracking. It is obvious that thick plates of ductile material may be stretched more easily on the upper surfaces, and consequently deeper impressions obtained, than with thin plates, since for thick plates more material can flow before fracture occurs. A similar course of reasoning can be used to explain the decrease of depth of impression with increasing thickness of plate in the case of material of less ductility. On the upper surface of the test pieces there occur high tensile stresses at the point above mentioned, which increase with the strength of the plate. As the material flows only to a small degree, cracks very soon appear and extend into the interior. The process described can be followed on the sections of a steel plate of about 40 kgs. per sq. mm. strength and a duralumin plate, Fig. 8. The flow before fracture of the steel plate is plainly recognisable while the duralumin plate shows hardly a sign of it.

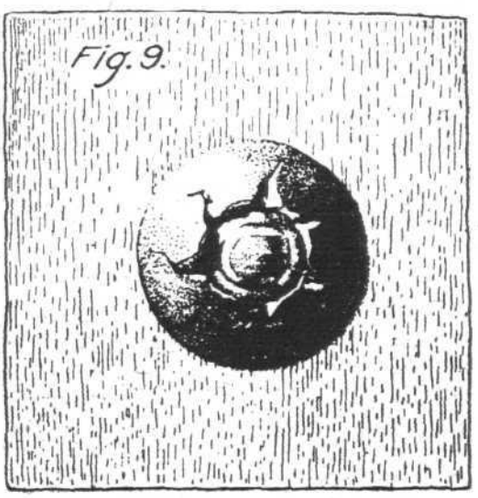
Fig. 9 is a photograph of a test sample of strong duralumin plate after fracture in which the material suddenly split in all directions.

For flanging and pressing tempered duralumin is consequently suitable only in the thin gauges.

Influence of Heat and Cold

Heat has an important influence on the strength of duralumin. According to the results obtained in tests by the Central Bureau for Scientific Investigation, Neubabelsberg, when heated the strength decreases 10 per cent. for an increase in temperature of 100°, and about 20 per cent. for an increase of 150° (*see* Fig. 10). The loss in strength increases with the increase of temperature. The elongation increases on first heating to a hardly appreciable extent, while between 150° and 200° it decreases. At 256° the elongation becomes the same as at room temperature. With

further heating the elongation increases with increasing temperature. Consequently wherever duralumin is exposed to heat the possible decrease of strength must always be considered.



Outside Fracture of Duralumin Plate

As opposed to the foregoing the influence of cooling on the strength properties is less unfavourable. The Central Bureau for Scientific Investigation has made tests on this also (*see* Table 3).

TABLE 3.—*Influence of Cold on the Strength of Duralumin*

Testing temperature	The bar was tested in	Tensile tests: Limit of stretch and strain	Tensile tests: Ult. strength kg/mm²	Tensile tests: Elongation per cent.	Impact test: Work of breaking kg/mm²
+ 20°	Air	24·0	42·5	21·9	2·6
0	Snow	23·6	43·0	21·8	2·6
— 20	Mixture of snow and table salt	24·0	43·7	23·1	2·7
— 40	Mixture of snow and calcium chloride	24·0	44·0	22·1	2·7
— 80	CO_2 snow	25·2	44·4	22·7	2·7
—190	Liquid air	32·3	53·7	28·7	2·6
+ 20	Air	23·0	42·3	23·3	2·6

The strength and elongation increase somewhat with the decrease in temperature. The work represented by the blow in the impact tests is not decreased when material is affected by cold, so that one can safely assume that the cold encountered in flight has no unfavourable influence on duralumin.

Future of Hounslow Heath Aerodrome

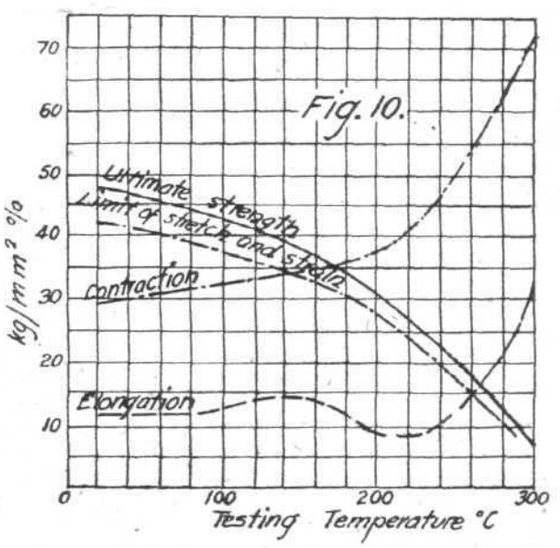
IT is understood that the War Office has decided to use the hangars and sheds at the Hounslow Heath aerodrome as a central repairing depôt of the R.A.S.C. for the whole kingdom, and to place Major Organ, D.S.O., in charge. The other side of the heath will be reserved for a trade school, under the Eastern Command, for training men leaving the Services in civil occupations under the new Army education scheme.

Experiments on the influence of weathering on the strength of duralumin which have been carried on by the Dürener-Metallwerke for three years, have shown that no observable decrease in the strength properties can be noticed (*see* Table 4).

TABLE 4.—*Effect of Weathering on the Strength of Duralumin*

Testing data alloy 681a	Dec., 1909: Strength kg/mm²	Dec., 1909: Elongation per cent.	Nov., 1910: Strength kg/mm²	Nov., 1910: Elongation per cent.	Nov., 1911: Strength kg/mm²	Nov., 1911: Elongation per cent.	Dec., 1912: Strength kg/mm²	Dec., 1912: Elongation per cent.
Round bar	41·7	20	42·2	21	42	21·1	42·9	18·3
Bar (thick) ..	39·1	20	38·7	19·6	39·3	18·9	40	20
Bar (thin)	42·0	20	39·1	18·0	39·3	18	42·3	16·5
Wire (thick) ..	48·0	20·1	45	20·1	44·3	19·7	44·5	19·8
Wire (thin) ..	46·3	20	44	19·6	42·5	18·7	43·2	18·5

The Dürener-Metallwerke have also carried on, for about a year, experiments on the influence of the electrolytic effect from junctions of duralumin with iron or steel. These



were made by riveting duralumin bars to iron plates, and then placing them in artificial sea water. There resulted only an insignificant destruction of the iron and a reduction in weight of the bars of about 0.23 per cent. so that no considerations exist against the use of duralumin and iron junctions in aircraft.

Summary

Duralumin has a strength of 35 to 40 kgs. per sq. mm., and an elongation of 10 to 15 per cent. The stretching strain limit lies very high, about 28 to 32 kgs. per sq. mm. The modulus of elasticity is about 600,000 to 700,000 kgs. per sq. cm. It is very brittle especially in thicknesses above 1 mm., and consequently sensitive to bending to and fro (alternating).

Bent Plate Fittings with bent lugs which must resist vibration are best not made out of duralumin, but of sheet steel. For stressed parts which while in flight are exposed to an increase in temperature of more than 100° C., the use of duralumin is objectionable unless a correspondingly smaller strength value is used in computations. Cold has no harmful influence on duralumin. The joint between iron and steel and duralumin can be made without electrolytic action occurring. Pieces, which for better working must be heated, must be in all cases re-tempered after completion.

A Full Load

THE Instone air liner, *City of London*, a Vickers-Vimy machine, on its trip from Paris to London on August 17, carried a party of 15 passengers, of whom 12 were ladies. There was also a load of goods aggregating 400 lb.

AIRISMS FROM THE FOUR WINDS

AERIAL work took its share in the great Polish counter-stroke. Possibly foreign honours may later on disclose the identity of distinguished British flying men who have once again made good.

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LORD DESBOROUGH, at next month's Congress of British Chambers of Commerce in Toronto, will preside as President. Having regard to the fact that he is also chief of the Imperial Air Fleet Committee, it is only fitting that the occasion of the meeting of the Congress should be taken advantage of by Canada to mark the connection in honour of the delegates. It will be remembered that during the past few years aeroplanes were presented to the Canadian Forces by the cities of Glasgow, Huddersfield and Leicester under arrangements by the I.A.F. Committee. These machines were used on the Western Front, but at the close of the War duplicate machines were again presented, and they are now being used in Canada by the newly-formed Canadian Air Force. These machines are now to meet the special train conveying the British delegates to the Chambers of Commerce Congress some way outside Toronto, and escort it for the rest of the journey.

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DESPITE the Versailles Treaty, the Germans expect a rapid recovery in aviation, is the latest and firm opinion of the Berlin special correspondent of the *Daily Telegraph*. The Deutsche Luftreederei, founded in May, 1918, by the A. E. G., has now forty postal, three large, and two small photographing aeroplanes, and ten seaplanes, which, up to the end of July, have undertaken 53,000 flights of 850,000 kiloms., and carried 5,038 passengers a distance of 460,000 kiloms. Lately a service to Copenhagen, Malmo, Hamburg, and Amsterdam has been started, which it is hoped to extend to London. Wake up England!

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OUR dear Teutonic friends are also not neglecting their efforts directly on the military side of aviation, if a French report from Warsaw last week is correct. According to this, the Polish Military authorities have just discovered the plot of an important German aerial organisation. From evidence obtained, German pilots are instructed to gather all information upon the state of railway, river or road transport, as well as of military movements in Polish territory. Instructions provide that in case of forced landing in Russian territory, German pilots must immediately apprise the military stations, so that these may lend them immediate assistance.

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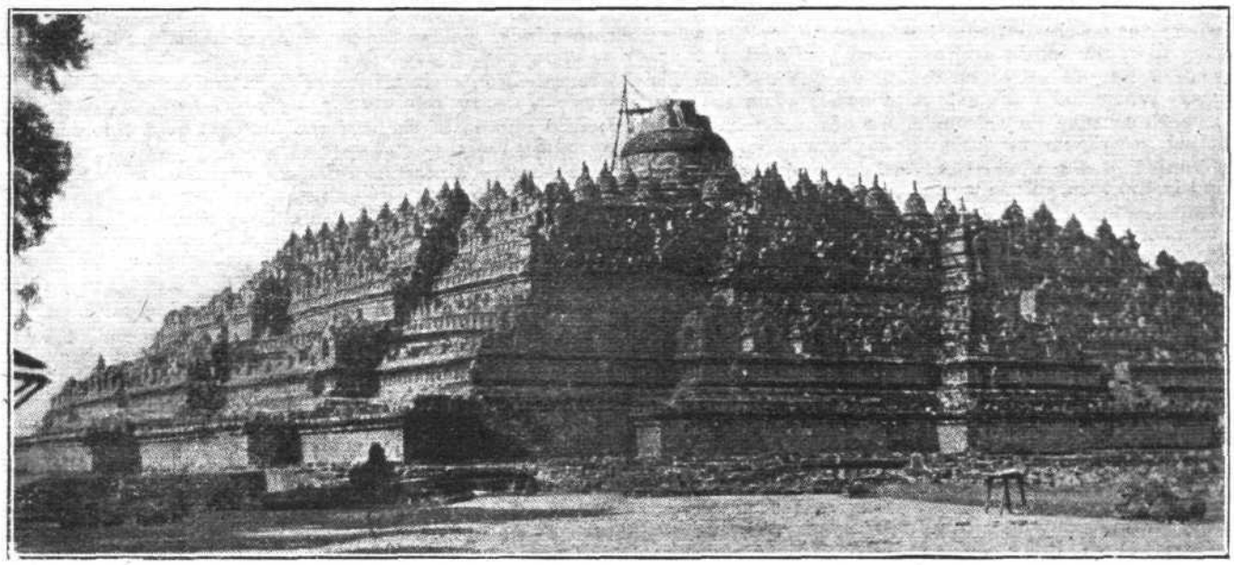
ANOTHER attempt to explore Belcher's Island, which was discovered about five years ago in Hudson's Bay, is under consideration by two commercial adventurers who intend to use aeroplanes for the purpose. It is said that they recently made an offer of £1,000 for a two or three weeks' trip from James Bay to the islands to the Bishop-Barker Aviation Company in Toronto. So far, however, it has not been found practicable to make this trip, owing to the fact that suitable aircraft of a type for the adventure were not available.

Curtiss Aero Photo.

Hazelhurst Field, seen above and from above, one of the best-known flying fields in the United States, has been acquired recently by the Curtiss Aeroplane and Motor Corporation for future testing work and flying operations. The field is located adjacent to the Garden City factory. Hazelhurst Field was one of the first aviation fields to be established at the outbreak of the War, and American aviators were trained there. An interesting feature of the transfer of the property is the fact that the deeds were transported from Washington by aeroplane. It is believed to be the first time that aeroplanes have been used in real estate transfers



General view of the Boro-Budur temple which, as a piece of architecture, is perhaps the greatest work of the ancients of the Far East

BROOKLANDS motor track and aerodrome is *now* mainly associated with the doings of the automobile fraternity, with occasional thrills from attempts by sprinters to get "over the top." Was it an attempt the other day at emulating in the air the bowl racers on *terra firma*, when a swan while flying the Brooklands course, overlooking the crude handiwork of man, made contact with a telegraph wire, crashing on to the course, with an injured wing?

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THE pilot Mattez seems to be enjoying the unique position of being paid to refrain from flying. He is practising on the Anterne lake with a waterplane with a view to flying to Lausanne, but as the lake is at an altitude of 2,230 m., his friends hold that the flight is a dangerous one. They have placed 5,000 francs in the hands of the French Consul to be handed to Mattez if he will give up the idea of making the flight. Presumably at about another 1,000 m. higher, the price would go up to about 10,000 francs.

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PROBABLY one of the most interesting and remarkable structures in the world is the wonderful hill temple of Boro-Budur in Java, one of the most gigantic and finest works ever reared by the ancients. In its construction there is represented probably more human labour and artistic skill than in the Great Pyramid. Yet this great monument of seventh-century architecture is hardly known by name even by modern visitors, for all practical purposes, not at all, and it is now suggested that by means of the aeroplane this neglect shall be remedied. Access to it is tiresome and difficult, but it is claimed that no trouble will be experienced in reaching the site of the Temple *via* the air, and this scheme, we learn from the *Scientific American*, is likely to materialise in the not far-distant future.

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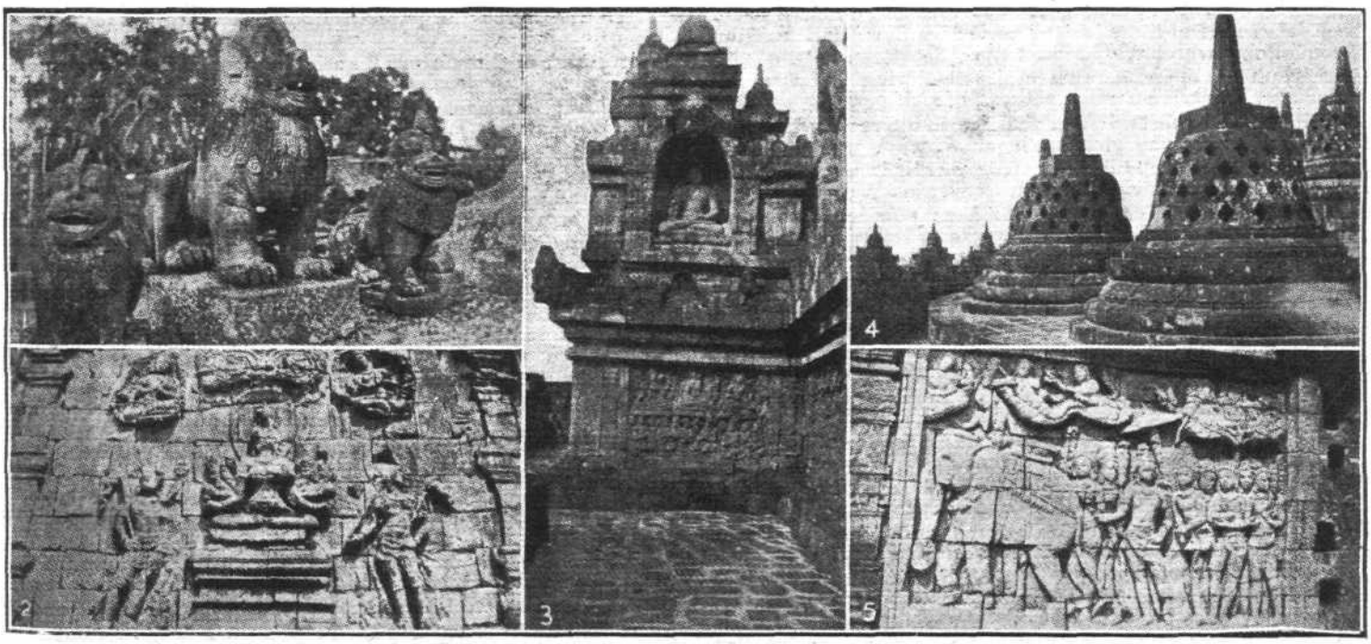
So unique is this fine example of ancient Indian art that the following particulars as supplied by Mr. Francis Dickie, and accompanying views of the structure, the work of Mr. Frank Burnett, a Canadian amateur archæologist, cannot fail to be of interest to our readers, especially having regard to the part to be played by aviation in opening up a more general knowledge of this Javanese edifice. Boro-Budur was built about the seventh century A.D., as far as is known from philological research. It lies in central Java, and owes



SOME DETAILS OF THE REMARKABLE HILL TEMPLE OF BORO-BUDUR IN JAVA: 1. These stone lions have been laughing for the past thirteen hundred years, with little if any signs of wear. 2. One of the many ornamental panels representing incidents in the life of Buddha. 3. A statue of Buddha sitting upon a lotus leaf. 4. Some of the 72 lattice-worked stone *dagabas* or shrines. 5. Another panel representing the life of Buddha

its origin to Buddhism. The ashes of Buddha were distributed by his great apostle, King Osaka of India, to eight towns where they were buried. Some time after the ashes were taken from the tombs and redivided into 84,000 parts. These were preserved in vases and given out over all his dominions. When the Buddhist missionaries came to Java in the seventh century they brought one of these vases, and, as a fitting receptacle for this, Boro-Budur, the world's greatest temple, was erected—the finest piece of architecture of its kind in the then known world, and one which has never been rivalled since. For about eight hundred years Boro-Budur was visited by millions of worshippers; then a Mohammedan invasion swept the country, and the temple was deserted. Jungle grew about it, and volcanic débris, from the countless active craters the island is famed for, covered it.

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IN 1814 it was discovered by accident by Sir Stamford Raffles, who started the work of restoring the temple to something of its former glory, which was continued by the Dutch authorities when they took back the island at the close of the Napoleonic wars. Due to this restorative work, the temple can be seen today much as it was thirteen hundred years ago.

Its out-of-the-way position, and the rather indifferent service by train, pony-cart, and later auto-'bus, are the principal reasons why it is not being visited by more travellers. In addition to this, it has not been extensively advertised like the Pyramids. All this now bids fair to be changed, for even in the Malay Archipelago—the land of rest, "to-morrow" and backwardness—things are now going ahead with leaps and bounds. Thus comes about the project of an aeroplane service to handle mail and passengers between different points in the Archipelago. The undertaking is backed by Dutch capitalists, the most conservative men in the world, so it may be taken for granted that it is thoroughly feasible, or they would not have considered it.

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REFERRING to the views of Boro-Budur, showing it as it is today, it will be seen as an artificial many-sided mound, with a series of galleries, cupolas and spires, surmounted by a vast central dome, 52 ft. in diameter, which at one time, it is supposed, was crowned with a spire. Upon ascending the outer terrace of this hill temple, a thirty-sided plain is reached. This, however, is not the original foundation. Excavation has disclosed two other terraces 6 ft. and 10 ft. respectively below the level of this plain. The Buddhist builders apparently deemed it advisable in this way to strengthen their structure while in course of erection. Formerly a heavy stone parapet surrounded the existing plain. In the middle of each of the four sides of this parapet an opening gave access to a flight of stairs, at the sides of which were heavy banisters. At the lower end of the stairs are huge laughing lions of stone, which still remain with their fixed laughter after thirteen hundred years, as seen in another view. From the plain similar stairs lead up to the irregularly-shaped galleries and on to the great circular one surrounding the dome, the latter thus being reached without it being necessary to pass through the intervening ones. Each of these many-angled terraces is about 10 ft. above the preceeding one, with a width between the walls of about 7 ft., and is drained by gargoyles representing mythical monsters, through the mouths of which the water is led.

At each angle is a Buddha seated in a niche. It is surmounted by a cupola. One of these is shown in one of our views. The Buddha is seated upon a lotus leaf with a halo around its head. The figure is almost nude. As the viewer passes around these galleries both sides are seen to consist of a series of sculptured pictures, surmounted with domes and pinnacles with Buddhas on all sides gazing at one with their inscrutable eyes. All the wonderfully artistic scenes are from the life of Buddha, depicting it from the time he left his lotus leaf throne to descend to earth, and his successive reincarnations until attaining Nirvana, the desired spiritual haven of Buddhism.

From the fourth gallery access to the upper level is gained by a stair of twelve steps. This level has only an outer wall upon which is erected three circular terraces, one rising a few feet above the other. Upon this are 72 remarkably uniform lattice-worked stone *dagabas* or shrines, each culminating in a slender spire as shown in the remaining view. These may also be noted in connection with the general view by studying same critically. Each of these beautiful bell-shaped shrines contains a statue of Buddha, each statue facing towards the central dome, which signifies that it is utterly detached from all the temptations and cares of this world.

"BEAUTY OF BRITAIN"

A YEAR or two ago, the only reply to an enquiry as to how one could see Britain's glorious scenery and unique beauties would be to refer the seeker after the picturesque either to a tourist agency or a series of expensively illustrated books. These days all this is changed. The cinema now rules in this dimension, and the results of the devotees to this art are becoming more wonderful month by month. The most convincing departure in this respect we have so far seen is a series of films just produced by the Humfries Film Productions, who have adopted the title at the head of this paragraph for their remarkable picture-stories. At a special show of the first five parts of this series, which covers Cornwall and its rugged coasts, it was possible to appreciate the marvellous advances which have been made by means of cinematography to bring home to the natives of this island the glories of their own country. And in the case of the Humfries Company a novel departure has been adopted, governing the entire idea which they have so enterprisingly materialised. It is a case of motion plus motion. In other words, the whole of the moving pictures are taken whilst flying in aeroplanes. You not only get the set picture, but you are travelling along the coast and over the towns and beauty spots with the operator.

The effect is remarkable, and sets many wondering as to how on earth any operator could get up so high as to photograph aircraft 5,000 feet above the earth, when suddenly the "working partner," or part of him, gets on to the screen, and the mechanism is automatically explained. We must congratulate the combination which conceived and has carried out so admirably this scheme of photographing England from the air. They should reap a rich harvest from the appreciation which the public cannot help but give to their efforts.

In a sort of "prefatory" reel, the Humfries people tell the story of their journey to Cornwall, the scene of their first "Beauty of Britain" series. Following this will be seen in their proper order (1) The Land of Lyonesse; (2) Britain's Wild West; (3) Portals of the Atlantic; (4) Cave and Cove; and (5) King Arthur's Stronghold.

Where all are so delightful it is difficult to give praise to any one in particular, but considered judgment inclines to No. 5 being, if anything, the culminating climax to almost an orgy of realism in beauty. What a relief it was to see some of the restful, yet animated, pictures, after the rollicking farces or dramatic fare usually associated with these "Movy" shows. Those who frequent the "Pictures" regularly should have an eye on the watch for these Humfries productions. They will well repay an extra visit.

Mr. Clifford Prodger Killed

A CABLE message from Redwood (Cal.) on August 23, announced briefly that Mr. Clifford B. Prodger, with two other aviators, had been killed in a crash from a height of 300 feet.

This news we record with the greatest regret. Mr. Prodger was one of that small group of test pilots who during the War carried out the work of actually testing machines in the air before they were put into service. In the course of his work he had flown practically every type of machine built during the months previous to leaving England for his native America.

About a year ago, he tested a large number of the four-engined Handley Page machines built by Messrs. Harland and Wolff, and delivered them by way of the air at either Martlesham or Folkestone. Since last April he had been engaged in demonstrating Bristol machines in the States, but no details are to hand as to the make or type of machine with which the accident occurred, or the cause of the crash.

Clifford Prodger came from America—he was born at Alexandria, Minn, in June, 1890—in February, 1915, to assist Mr. G. W. Beatty in training pilots for the R.N.A.S., and when the school closed down he made a name for himself in the testing of machines, his calm, analytical mind being admirably adapted for work of this nature. His services were much sought after by manufacturers, who knew that he would not only get the best out of their machines, but also that he would not be afraid to point out faults which could be remedied.

FLIGHT

"FLYING AND SPORT IN EAST AFRICA"

THE squadron of the R.F.C. which was detailed for service in East Africa at the beginning of 1916 had their full share of troubles. Nominally, it was a South African squadron, but actually a large percentage of the officers were East African settlers or ex-civil servants or officers transferred from British squadrons; this led to an extraordinary amount of jealousy, favouritism and ill-feeling. Further, the Dutch General Staff were not favourably disposed toward the new arm; they looked upon the aeroplane as an expensive toy, useless either as a substitute for, or an auxiliary to, cavalry, particularly Dutch cavalry. Also, the machines, and particularly the engines, sent out to East Africa, were not of the latest and best, so that the pilots had anything but an easy time. No photographic officer was appointed, and the equipment of this department was, to say the least, very meagre. Yet the R.F.C. during the two years' campaign in East Africa certainly did justify its existence, as anyone who reads Mr. Leo Walmsley's "Flying and Sport in East Africa" can see for themselves. In an introduction, Maj.-Gen. Sir Edward Northey, K.C.M.G., says that he "never agreed with those writers on the East African campaign who have suggested that, owing to the wildness of the country and density of the bush, aeroplanes were of little use. Each flight was made with a definite object, which was generally fulfilled. For making sketch-maps of unsurveyed country, for obtaining details of topography, mountains, rivers, swamps, and other military obstacles, for bombing and otherwise directly attacking the enemy's camps or porter convoys, and for keeping up communication between the wide-spread units of a command, the aeroplane fully justified its use."

Mr. Walmsley has written an intensely interesting book, the practical information being well-leavened with humorous anecdote. The book, illustrated with a number of photographs and maps, is published by Messrs. Wm. Blackwood and Sons at 10*s*. 6*d*. net.

Aeronautics at the Imperial College

A COMPREHENSIVE scheme of instruction and training, mainly post-graduate in character, has been arranged by the Aviation Department of the Imperial College at South Kensington, for next session beginning in October, including special sections in aeronautical engineering, meteorology, and navigation. It may be recalled that the staff include Sir Napier Shaw as Professor of Meteorology; Dr. Leonard Bairstow, Professor of Aerodynamics; Mr. A. J. Sutton Pippard, who will deal with the structure and strength of aircraft, and Mr. A. T. Evans, whose province will be aircraft engines. Courses of lectures will also be given dealing respectively with airships and with navigation, while arrangements are in hand for special instruction in air-cooled engines, high-compression engines, dopes, instruments, wireless telegraphy and similar subjects. It has also been arranged that students will carry out part of their practical training in one or other of the Government establishments concerned with aeronautics.

Mails by Aeroplane in Ireland

OWING to the increasing frequency of raids on mail trains in Ireland, aeroplanes are being used more and more for conveying military correspondence.

A U.S.-Canada Mail

OFFICIAL sanction has been given to a scheme for maintaining an aerial mail between Seattle and Victoria, B.C., which will enable mail matter for the Pacific liners sailing from Victoria to be posted in the States later than is at present possible.

New York-San Francisco Mail

IT is anticipated that the aerial mail between New York and San Francisco will be inaugurated during the first week in September, but a good deal depends upon whether all the landing grounds can be completed in time. For the section from New York to Omaha, J.L. (Junkers) all-metal monoplanes will be used, while from Omaha to the Pacific Coast de Havilland machines will maintain the service.

A Trip Round the World

IN connection with the race round the world which the Aero Club of America and the Aerial League of America have been organising for some months past, it is announced that arrangements have been made tentatively for a Handley Page W.8 to make a test flight over the route. It is proposed to start from London and fly in an easterly direction. It is hoped that ten passengers will come forward to make the trip and share the cost between them.

U.S. Transcontinental Race

THE race from New York to San Francisco, arranged by the Aero Club of America, is open to any pilot holding a F.A.I. *brevet*. The Pulitzer Trophy will be awarded to the aviator who makes the best average flying time per mile between the two points, starting from New York on or after October 18 and finishing in San Francisco on or before November 20, 1920. There will also be cash prizes for the best average flying time per mile between New York and certain cities on the route. Entries close on October 11.

U.S. Orders Torpedo-'Planes

IT is stated the United States Navy Department has placed an order with the Stout Engineering Co., of Detroit, Michigan, for the construction of six "torpedo-'planes" for the United States Navy. A further order, for nine such 'planes, has been given to the Curtiss Engineering Corporation.

New Insignia for U.S. Navy 'Planes

A NEW distinguishing badge for aircraft belonging to the U.S. Marine Corps Aviation Service has been approved. It consists of a naval anchor, on which is a large cockade with the outer circle red, the middle blue and the centre white, and above the whole is the American eagle with outspread wings.

U.S. Army Flier for G.B. Cup

IT is anticipated that the machine entered for the Gordon Bennett Aviation Competition, by the U.S. Army authorities, will be in France very shortly now. The machine is called the Verville, after its designer, and it has been developed at McCook Field, Ohio, for pursuit work in war time. Capt. Rudolph W. Schroeder has been nominated to pilot the machine with Capt. Corliss C. Moseley as the reserve pilot.

Bolshevist Aerial Activity

WRITING from Constantinople on August 16, *The Times* correspondent states that on the Dnieper front Bolshevist aircraft recently made a number of bombing raids, a new departure for them in this theatre, where their aircraft have hitherto played a very passive *rôle*.

Blown up by Bomb

THE dangers of landing with bombs was emphasised at the Spanish fort of Ceuta in Northern Morocco last week. Capt. Rojas, of the Engineers, was landing on his return from bombing rebel tribes in the Tetuan neighbourhood, when one of the unused bombs struck the ground and exploded, blowing the machine and pilot to pieces.

The Aerial Detectives

LAST week, according to a French contemporary, the French flying school at Istres was the scene of a burglary, and the thieves got away with a safe among other bric-à-brac. The commandant of the school, after a thorough search had been made of the premises and the immediate neighbourhood, sent out two aeroplanes to carry out a search. One of the pilots "spotted" what looked like a newly made mound, and on landing beside it, found it covered the missing safe, which still contained some 20,000 francs in cash. Apparently there is no end to the practical uses of the aeroplane, but we thought at first the point was that the burglars had taken the safe away in an aeroplane.

A Fatality at Bedford

THE inquest was opened on August 17, at Biddenham, near Bedford, by the county coroner, on the body of James Gordon Riley, a civil airman, aged 21. Mr. Riley's brother said he was formerly in the R.A.F., and took his certificate in 1917. The machine in which he and his mechanic, named Hamblin, of Brixton, crashed on Monday night, had been on passenger flights. Three weeks ago it was forced to land in growing corn, and had to be left where it was until the corn was cut. This was done last week. The inquest was adjourned for the attendance of Hamblin, who is in Bedford Hospital suffering from cuts.

Double Fatality in Brazil

A REPORT from Buenos Ayres states that Capt. John Pinder, a British officer, and Lieutenant Martins, a Brazilian, have been killed near Lake Estebes, in Brazil, while making the first attempt to fly from Rio de Janeiro to Buenos Ayres for the prize offered for this flight by the Brazilian Government. It is said that the crash was due to trouble with the motor.

THE ROYAL AIR FORCE

London Gazette, Aug. 17

Short Service Commissions

Flying Officer W. Chapman (T.) resigns his short service commn., and is granted rank of Capt.; Aug. 18.

Flying Branch

M. J. Sheehan (Sec. Lieut., R. Mun. Fus.) is granted a temp. commn. as Sec. Lieut. (O.); Aug. 8, 1918 (since killed). Sec. Lieut. R. Inglis (Sec. Lieut. High. L.I., T.F.) relinquishes his temp. R.A.F. commn., on return to Army duty; Dec. 19, 1918.

Transferred to Unemployed List.—Lieut. A. F. Wilson; Feb. 28, 1919. Lieut. J. F. Higgins; June 21, 1919 (substituted for *Gazette* July 8, 1919). Lieut. G. Murray; Aug. 18, 1919. Sec. Lieut. J. McP. Rennie; Sept. 19, 1919. Lieut. H. W. Baggs, Sec. Lieut. W. C. Dargavel, Sec. Lieut. A. D. Greenhough, Sec. Lieut. L. W. John, Sec. Lieut. W. H. S. Kingsland, Sec. Lieut. E. R. N. Main, Lieut. W. J. Tremellen; Aug. 5. Pilot Officer W. U. Ingram relinquishes his commn; March 3. Sec. Lieut. H. A. Fourte relinquishes his commn., and is permitted to retain his rank; July 19 (*Gazette* Feb. 6 to stand).

Sec. Lieut. W. C. Fuckelton relinquishes his commn. on account of ill-health contracted on active service, and is permitted to retain his rank; Aug. 11. The notification in *Gazette* Dec. 31, 1918, concerning Lieut. R. Inglis, is cancelled.

Administrative Branch

Flying Officer (Act. Flight Lieut.) G. Roberts relinquishes the acting rank of Flight Lieut. on ceasing to be empld. as Flight Lieut.; June 2. Lieut. A. F. Harris to be Lieut., from (O.); July 29, 1919 (substituted for *Gazette* of Oct. 10, 1919). Flight. Lieut. T. N. Flatt (Capt. Norf. R., T.F.) relinquishes his temp. R.A.F. commn. on return to Army duty; July 19.

The following Sec. Lieuts. relinquish their commns. on ceasing to be empld.: G. A. Maddams; July 29. P. S. Stewart; July 30.

Transferred to Unemployed List.—Capt. A. H. Handman, M.B.E.; Oct. 14, 1919. Sec. Lieut. (Act. Lieut.) W. Butler; Oct. 31, 1919 (substituted for *Gazettes* of Nov. 11, 1919, and June 22). Lieut. W. Knight, Lieut. G. Roberts; Aug. 5.

The notification in the *Gazette* of May 18 concerning Pilot Officer E. P. Dampier is cancelled.

Technical Branch

Pilot Officer L. B. Lewis to be Flying Officer; Oct. 1, 1919 (substituted for *Gazette* of May 18).

Pilot Officers to be Flying Officers without pay and allowances of that rank: R. J. Finch (since demobilised), J. W. Rodmell (since demobilised); Oct. 1, 1919.

Capt. E. Ball is placed on the retired list; Aug. 18.

Transferred to Unemployed List.—Capt. R. N. Liptrot; Aug. 1, 1919 (substituted for *Gazette*, Jan. 30). Capt. C. J. Turner; Jan. 1 (substituted for *Gazette*, Feb. 6). Lieut. T. H. Youens; April 21 (substituted for *Gazette*, May 14). Lieut. (Hon. Capt.) R. Godfrey; Aug. 1. Lieut. H. Butler (Sec. Lieut. Gen. List) relinquishes his temp. R.A.F. commn. on retirement from the Army, and is permitted to retain the rank of Lieut.; Aug. 18.

Memoranda

Wing. Comdr. J. St. J. Murphy (Surg. Comdr., R.N.), having retired from the R.N. and relinquished his R.A.F. commn., is granted permission to retain the rank of Lieut.-Col.; July 1.

E. L. Youngleson (late temp. Sec. Lieut., R.A.F.) is deprived of the hon. rank of Sec. Lieut. on conviction by the Civil power; July 16.

Twenty-seven Cadets are granted hon. commns. as Sec. Lieuts. with effect from the date of their demobilisation.

Proby. Flight Officer W. N. Jackson is granted an hon. commn. as Sec. Lieut.; March 4, 1919.

London Gazette, Aug. 20

Short Service Commissions

Flying Officer S. G. Frogley, D.S.O., D.F.C. (A.), relinquishes his short-service commn. on account of ill-health contracted in the Service, and is granted the rank of Flight Lieut.; June 24 (substituted for *Gazette*, July 13).

Flying Branch

Flying Officer N. G. Pring to be Act. Flight Lieut. while empld. as Flight Lieut. (A.); from April 5, 1919, to Oct. 11, 1919.

Transferred to Unemployed List.—Lieut. J. O. Turnbull; Jan. 29, 1919. Sec. Lieut. W. M. Cowper; March 20, 1919. Lieut. E. B. Hedley; March, 21, 1919. Lieut. J. P. Castle; April 15, 1919. Sec. Lieut. G. Brownrigg; May 11, 1919 (substituted for *Gazette*, Aug. 3). Sec. Lieut. W. F. Watson; May 29, 1919. Sec. Lieut. H. S. Russell; Aug. 11, 1919. Lieut. G. Murray; Sept. 27, 1919 (substituted for *Gazette*, Oct. 4, 1919). Lieut. T. B. Howard; June 1 (substituted for *Gazette*, June 8). Sec. Lieut. A. Morrison; July 16. Lieut. G. W. Higgs; Aug. 9.

Lieut. B. S. Eytinge relinquishes his commn. on account of ill-health, and is permitted to retain his rank; Nov. 30, 1918 (substituted for *Gazette*, Nov. 29, 1918).

Sec. Lieut. S. C. Lambert relinquishes his R.A.F. commn; July 30 (notification in *Gazette*, Feb. 28, 1919, to stand).

The following Sec. Lieuts. relinquish their commns. on account of ill-health caused by wounds, and are permitted to retain their rank: J. P. Henchie; Aug. 7. N. Fielden; Aug. 13. The surname of Sec. Lieut. W. C. Frickleton is as now described, and not as stated in the *Gazette* of Aug. 17. The Christian name of Sec. Lieut. Alexander Bennett is as now described, and not as stated in the *Gazette* of Aug. 3. The notification in the *Gazette* of Feb. 21, 1919, concerning P.O.O. R. C. Emmett is cancelled. The notification in the *Gazette* of July 23, 1918, concerning Sec. Lieut. T. Powers is cancelled.

Administrative Branch

Transferred to Unemployed List.—Lieut. S. H. Ellis, M.B.E.; April 25, 1919. Lieut. J. Hicks; Aug. 5.

Technical Branch

Lieut. F. Ederett is placed on the retired list; Aug. 21.

Transferred to Unemployed List.—Sec. Lieut. (Hon. Lieut.) A. Barr; Jan. 21, 1919. Capt. A. C. Burgoine (substituted for *Gazette*, Feb. 3). Lieut.-Col. L. F. R. Fell, D.S.O., O.B.E. (substituted for *Gazette*, Feb. 3.). Capt. F. T. Hill (substituted for *Gazette*, Jan. 30.) Maj. G. McAlpine (substituted for *Gazette*, Feb. 3). Lieut. A. F. Cressall; Aug. 4, 1919 (substituted for *Gazette*, Feb. 3). Lieut. W. Nettleship; May 29 (substituted for *Gazette*, June 4); Aug. 1, 1919.

Medical Branch

Transferred to Unemployed List.—Capt. W. G. Weston; March 31. Capt. J. D. Cherry; July 31.

Memoranda

Then follow the names of 33 Cadets granted hon. commns. as Sec. Lieuts.

Lieut. A. C. Tapster (S.O.) is transferred to unemployed list; Aug. 3.

Temp. Hon. Lieut. K. Burton relinquishes his temp. hon. commn. on ceasing to be employed; Oct. 1, 1919.

Personals.

Killed in Action

Capt. E. LAWRIE BUCHANAN (late R.A.F.), Assistant Irrigation Officer, who was killed in action at Shahraban, Mesopotamia, on August 15, at the age of 27, was the only son of the late J. B. Buchanan, A.M.I.C.E., Chief Engineer of Hyderabad, Deccan, India, and Mrs. E. F. Buchanan, of 32, Elsworthy Road, N.W., and 38, Percy Avenue, Kingsgate. Mr. Edward Lawrie Buchanan, who, with other officers of the Mesopotamian services, was killed by Arabs at Shahraban on the Persian Road, was born in 1893, and educated at Clifton College. He was trained as an engineer, and joined the Artists' Rifles and went to France on October 26, 1914. He received a commission in the R.F.A. in July, 1915, and was attached to the Air Force, being eventually Flight-Com. in the observation balloons on the Somme. Invalided home, he spent the remainder of his war service in airships on duty with the Grand Fleet, getting his captaincy in 1916. After he was demobilised he was sent by the India Office to Shahraban as Assistant Irrigation Officer. He married in 1915, Zetton, third daughter of Mr. and Mrs. L. Chesnay, and leaves a son of 22 months.

Death

Capt. SIDNEY COWELL, R.A.F., attached to the Air Ministry, Kingsway, who was drowned while boating in the Thames on August 22, was the only child of Mr. and Mrs. Cowell, of Corinne Road, Tufnell Park.

Married

Capt. FRANK CROSSLEY BROOME, D.F.C., A.F.C., younger son of Mr. and Mrs. Frank Broome, of Winterbourne, Weybridge, was married at All Saints', Great Horkesley, Colchester, on August 17, to Miss ISMAY LERMITTE, daughter of the late Lieut.-Col. Lermitte and Mrs. Lermitte, of Woodhouse, Great Horkesley. Capt. S. Cockerell, A.F.C., was best man.

Capt. FRANCIS CHARLES TOWNSHEND, 6th Rifle Brigade, late R.A.F., third son of the late Lieut.-Col. G. P. Townshend, was married on August 1 at Hampton to MARGERY GERTRUDE, only daughter of Mr. and Mrs. E. C. ST. AUBYN.

To be Married

A marriage has been arranged, and will shortly take place, between Group Capt. P. R. C. GROVES, C.B., C.M.G., D.S.O., R.A.F., eldest son of Mr. J. Groves, late P.W.D., India, and Mrs. Groves, and SUZANNE, daughter of Mr. T. E. STEEN and Mrs. STEEN of Christiania and 107, Rue de la Pompe, Paris.

The engagement is announced of Lieut. A. W. HULBERT (late R.A.F., only son of Councillor A. G. Hulbert of Bowes Park, to IDA D. STEPHEN, youngest daughter of James L. Stephen, of Palmers Green.

Item

Mr. EVERARD R. CALTHROP, whose book "The Horse, as Comrade and Friend," will be published shortly, is the brother of the late Sir Guy Calthrop, the Coal Controller, and a cousin of Dion Clayton Calthrop, the well-known novelist. In "The Horse, as Comrade and Friend" he describes the system of slow and gradual training which in his own experience has proved successful in dealing with horses. The book is full of interesting information of value to both professionals and amateurs.

FLIGHT

All communications to be addressed to the Model Editor. A stamp should be enclosed for a postal reply

A Whirling Arm

SEVERAL clubs have written to me asking for descriptions of testing apparatus which may be modelled in their workshops, and I herewith show the first piece of such apparatus —a whirling arm, of a type which has been suggested many times.

Another one which I will give is a smaller machine to be used for measuring the static thrust of propellers. Thus by means of the two pieces of apparatus the most important tests can be made to find the difference between the static or stationary thrust and the thrust developed when moving with various types of propellers. The revolving arm can also be used in the manner to be described later for measuring the lift of different size surfaces, and the thrust required to drive the surfaces forward.

The apparatus consists of two principal parts—the heavy base on which the whole stands upon the floor, and from which a stationary post rises, and the revolving portions, made up of the long arm carrying the propeller, planes, etc., to be tested, the counterpoise arm with its lead weight, and a receptacle to carry weights to balance the thrust developed. A complete side elevation is shown in the drawing, to a scale which is set out at the foot of the drawing.

I have arranged that the length of the arm, which length is of course the radius of the circle swept by the end of arm, shall be such that in one revolution of the apparatus the propeller, etc., shall travel a definite number of feet, so that the distance travelled by the propeller shall be known without any intricate calculation. The arm is to measure 6 ft. 4½ ins., from the centre of the vertical shaft to the point on which the centre of the propeller spindle will come, so that the circumference of the circle equals 40 ft. Thus, if the arm makes, say, six revolutions at one winding of the propeller, we know that the propeller has travelled 240 ft., and from this we can easily arrive at the slip percentage.

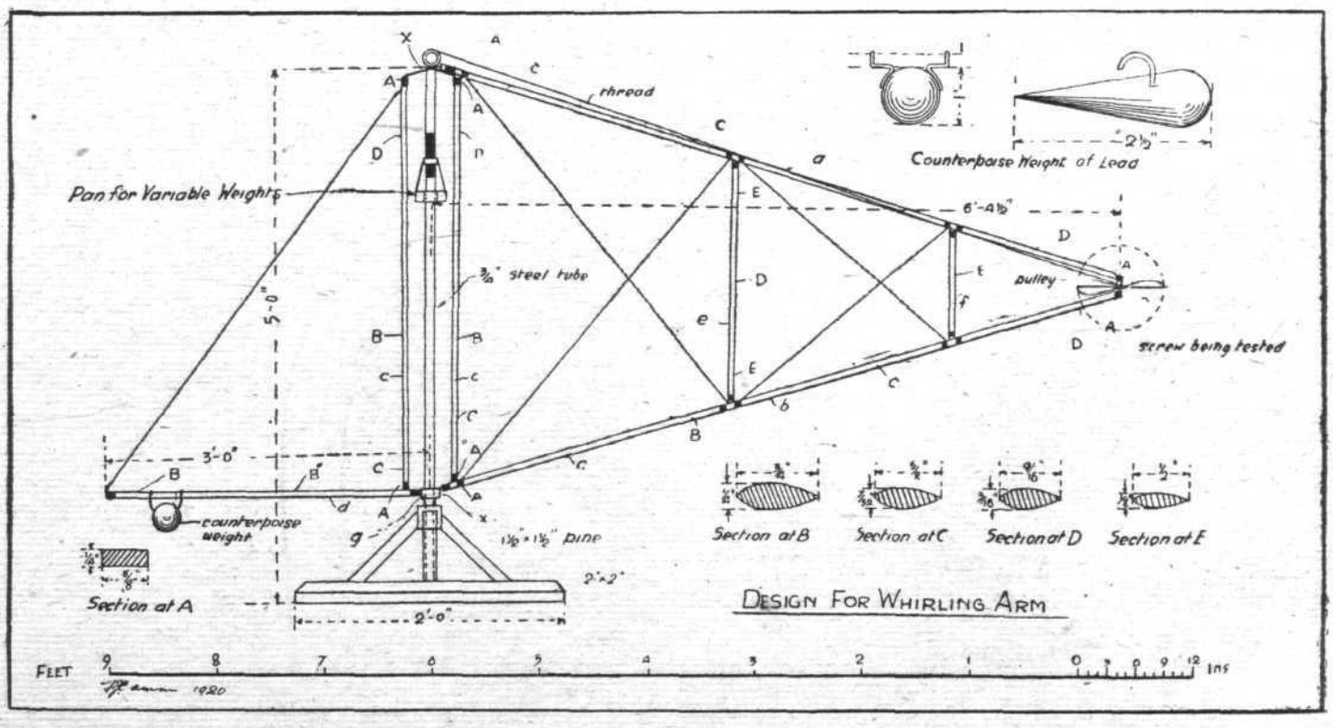
The wooden cross-armed base should be made first, the two arms being halved into each other. These should be of 2 ins. by 2 ins. deal or pine. Rising from the cross-arms at an angle of 45 degrees, there are four struts of 1½ in. by 1½ in. deal. These unite at the top on a piece of 2 ins. by 2 ins. deal, 3½ ins. in length, placed with the grain upright, all joints being made with a short tapering tenon and mortice.

Next obtain a 5-ft. length of ⅜-in. steel cycle tubing, of about No. 18 gauge, the exact gauge, however, not being of much importance. This tube is to be passed through the top block on which the struts unite and into the cross-armed base, but not quite through the latter. The top end of the tube should be filed, or better turned off, quite true, and great care should be taken to get the tube square with the base.

The wooden members of the revolving portion can now be got out, five of them in all. They may be made of any suitable light wood, good straight-grained pine being as good as anything. As it is very desirable that resistance to forward motion in the arm be reduced to a minimum, the whole of the moving parts should be as light as possible. To reduce resistance due to friction, ball-bearings are to be provided at XX. Atmospheric or head resistance is to be minimised by making all the wooden members of streamline form in cross-section, as shown. This figure gives the sizes as well as the shape at the various points in the lengths of the members.

The member marked *b* will be cut 6 ft. 6 ins. long and ¾ by ¼ in. section at the largest part, which is at B, about one-third of its length up from the bearing end. This member being in compression, requires to be made a little stiffer than the top one, *a*, which measures 6 ft. 7 ins. in length and ⅝ in. by 7-32 in. in section. Rods *c*, *c*, are 3 ft. 11 ins. in length, and *d* are 3 ft. Rod *a* is the only one in tension, and therefore does not need to be as large in section as the others. Rods *e* and *f* are light ones only, as will be seen by reference to the sections; *e* measures 2 ft. 1½ in. in length, and *f* is cut 11 ins. long.

Most of the spars are to be left rectangular in section where they join another spar, as indicated by the letter A in the drawing, the joints being made with fish plates of brass lashed on to the wood. Two outrigger spars, 12 ins. long each, are to be fixed to the lower bearing immediately over the base; these are marked *g*; they will be of A section at the joint and taper off to section E. They will project at right angles to *b* and *d*, and braced to these with fine wires.



SIDEWINDS

MESSRS. ARMSTRONG-SIDDELEY MOTORS, LTD., of Coventry, and 10, Old Bond Street, W., announce the opening of a new London service depôt at Church Street, Lisson Grove, N.W. 8, for the convenience of owners requiring advice and inspection of their cars. The works are well equipped, and there is a staff of trained mechanics. Special facilities are provided for adjustments and overhauls to chassis, electrical equipment and coachwork. Exceptionally fine garage accommodation is available, and a supply of spare parts is maintained.

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INCLUDED in the programme for the Clacton Regatta on Wednesday, September 15, is a handicap race for motor-boats, and as the prize list is a generous one it provides an admirable opportunity for sporting owners of speedy craft to try their luck. The prizes include the Coan Challenge Cup, value 30 guineas, presented by the Commodore, Mr. R. W. Coan, which is to be won outright two years in succession, or three years in all, and the winner will also receive a replica; the second prize is £5, and the third £3. Entries close on September 8, and should be sent to the Secretary, at the Royal Hotel, Clacton-on-Sea, the fee being 5s.

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IN turning over some old papers the other day we were greatly interested to come across a copy of the *Beardmore News* of May 28, 1919. Contained in it was an article by Mr. G. Tilghman Richards, F.R.Ae.S., M.I.M.E., the Manager of the Beardmore Aviation Dept. at Dalmuir, and later events have shown that his foresight was more than justified. It was an appeal to develop aircraft and aviation on sound lines as distinct from the hurried improvisation of war-time. Mr. Tilghman Richards emphasised the especial need for the development of a cheap, safe and thoroughly reliable power, and pointed out that a commercial aeroplane in daily commission burns approximately its own value in fuel per annum. With individuals of such broadminded and clear vision in charge of affairs it is not surprising that things are progressing at Dalmuir.

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ONE of the results of the visit of Mr. D. C. Hutchinson to the other side is an expansion of the Titanine organisation in the States. In order to speed up deliveries and obviate any delay, the executive offices of the U.S. company have been transferred to the Works at Union, N.J.

PUBLICATIONS RECEIVED

The Tenant's Emergency Charter (Houses, Shops, etc.) under the Rent Restriction Act, 1920. London: Oliver and Boyd, 33, Paternoster Row, E.C. Price 2s. net.

In the Clouds above Baghdad. By Lieut.-Col. J. E. Tennant. London: Cecil Palmer, Oakley House, Bloomsbury Street, W.C. 1. Price 15s. net.

Income Tax and Super-Tax. Tabular View of 1920 Budget Changes. London. Oliver and Boyd, 33, Paternoster Row, E.C. Price 1s. net. Post free, 1s. 2d.

Airscrews in Theory and Experiment. By A. Fage, A.R.C.Sc., D.I.C. London: Constable and Co., Ltd. Price 34s.

Principles and Practice of Aerial Navigation. By Lieut. J. E. Dumbleton. London: Crosby Lockwood and Son. Price 12s. 6d. net.

Practical Guide to the British War Area in France and Belgium. Vickery, Kyrle and Co., Ltd., 22, Gray's Inn Road, W.C. Price 2s. net.

Report No. 79. Bomb Trajectories. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Report No. 86. Properties of Special Types of Radiators. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Technical Note No. 9. Theory of Lifting Surfaces, Part I. By L. Prandtl. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Technical Note No. 10. Theory of Lifting Surfaces. Part II By L. Prandtl. National Advisory Committee for Aeronautics. Navy Building, Washington, D.C., U.S.A.

The Aeroplane Handbook. Edited by A. J. Swinton, F.R.G.S., F.R.C.I. London: The "Aeroplane" and General Publishing Co., Ltd., 61, Carey Street, W.C. 2. Price 21s. net.

L'Année Aéronautique 1919-1920. By L. Hirschauer and Ch. Dollfus. Paris: Dunod, 47-49, Quai des Grands-Augustins. Price 20 fr.

Catalogue

Aviation Appliances for Civilian and Military Use. The Yorkshire Steel Co., Ltd., 30, Holborn, London, E.C. 1.

Wireless Telephone Developments

ELSEWHERE in this issue we refer to the successful "calling up," by telephone, of their aeroplane City of London while flying to Paris on August 19, by Messrs. Instone and Co., which marks a step forward in the experiments in wireless telephony which have been carried on for some time by the Air Ministry with the co-operation of the Marconi Co., and the G.P.O. After the machine had left the Croydon Aerodrome for Paris about midday, with ten persons on board, it was found to be urgent to convey some special instructions to Mr. Chattaway, the pilot, on business connected with coal supply at Marseilles, which had been affected by the strike at Cardiff. Mr. Samuel Instone telephoned to the Air Ministry asking for their help, and was enabled by them to have the ordinary telephone into which he was speaking in his own office connected with their wireless telephone installation at Croydon. By the combined telephones he got through to Mr. Chattaway and after one or two calls Mr. Chattaway replied and said he had just passed over Folkestone. Mr. Instone gave him the instructions which he was anxious to communicate, and as an additional test of the capabilities of the telephone under these special conditions, Mr. Chattaway read a passage from a newspaper, which Mr. Instone was able to follow. At one point communication was interrupted at the telephone exchange and was restored again in the ordinary way after conversation with the operator there.

Mr. Instone said he could hear the whirring of the propellers of the machine and the voice of the pilot was as audible as if he were making an ordinary trunk call; he could hear as plainly as if he were listening to somebody speaking to him from Paris.

AERONAUTICAL PATENTS PUBLISHED

Abbreviations:—cyl. = cylinder; I.C. = internal combustion; m. = motors.

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1919

Published August 26, 1920.

7,001. J. B. ICRE. Propellers. (148,596.)
7,957. E. C. JANSON. Aero motors. (148,601.)
9,969. D. A. PAVELEY. Power plant for model aeroplanes. (148,610.)
10,587. G. MERTON. Clinometers, etc. (148,635.)
20,004. E. E. BROWN and D. J. MOONEY. Metal construction for aircraft. (148,698.)
27,682. R. ESNAULT-PELTERIE. Explosion motors. (136,805.)

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